Oxford English for

Computing

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Oxford University Press

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Contents



Personal computing

Start-up

Task 1 Name these devices. What are they used for?

a

c

b

d

Listening

Task 2 You will hear two interviews between a market researcher and visitors to a computer exhibition. As you listen, fill in the missing information in the table opposite.

	Interview 1	Interview 2
Name:		
Occupation:		
Type of PC used:		
Reasons for choice: 1		
2		
3		

Task 3

Read this extract from Interview 2 and fill in the gaps. To help you, the first letter of each missing word is given.

INTERVIEWER: Do you own a PC?

ENRIQUE: Yes, I have an Apple Macintosh.

INTERVIEWER: Why did you c__choose__ [1] a Mac as opposed to an IBM or an IBM c________ [2]?

ENRIQUE: I think Macs are e________ [3] to use than IBM PCs. I use the m________ [4] feature a lot, which is s________ [5] on all Macs. Then there's the graphical user interface and the windows.

INTERVIEWER: Graphical user interface? Could you explain that?

ENRIQUE: Well, put simply, it means that you click on i________ [6] instead of typing in c________ [7].

INTERVIEWER: I see. You mentioned windows. Doesn't IBM also use windows?

ENRIQUE: Yes, but I think their windows are harder to s________ [8] u________ [9]. In any case, I'm u________ [10] t________ [11] the Mac.

Now listen again to the interview and check your answers.

Reading

Task 4

Before reading the text on the following page, match each word with the correct definition:

1	mainframe	**a**	the set of software that controls a computer system
2	mouse	**b**	a very small piece of silicon carrying a complex electrical circuit
3	icon	**c**	a big computer system used for large-scale operations
4	operating system	**d**	the physical portion of a computer system
5	software	**e**	a device moved by hand to indicate position on the screen
6	hardware	**f**	a visual symbol used in a menu instead of natural language
7	microchip	**g**	data, programs, etc., not forming part of a computer, but used when operating it.

Task 5 Now read the text and decide on a suitable title for it.

In 1952, a major computing company took a decision to get out of the business of making mainframe computers. They believed that there was only a market for four mainframes in the whole world. That company was IBM. The following year they reversed their decision.

In 1980, IBM decided that there was a market for 250,000 PCs, so they set up a special team to develop the first IBM PC. It went on sale in 1981 and set a world-wide standard for IBM-compatibility which, over the next ten years, was only seriously challenged by one other company, Apple Computers. Since then, over seventy million PCs made by IBM and other manufacturers have been sold. Over this period, PCs have become commodity items. Since IBM made the design non-proprietary, anyone can make them.

The history of the multi-billion dollar PC industry has been one of mistakes. Xerox Corporation funded the initial research on personal computers in their Palo Alto laboratory in California. However, the company failed to capitalize on this work, and the ideas that they put together went into the operating system developed for Apple's computers. This was a graphical interface: using a mouse, the user clicks on icons which represent the function to be performed.

The first IBM PC was developed using existing available electrical components. With IBM's badge on the box it became the standard machine for large corporations to purchase. When IBM were looking for an operating system, they went initially to Digital Research, who were market leaders in command-based operating systems (these are operating systems in which the users type in commands to perform a function). When the collaboration between IBM and Digital Research failed, IBM turned to Bill Gates, then 25 years old, to write their operating system.

Bill Gates founded Microsoft on the basis of the development of MS/DOS, the initial operating system for the IBM PC. Digital Research have continued to develop their operating system, DR/DOS, and it is considered by many people to be a better product than Microsoft's. However, without an endorsement from IBM, it has become a minor player in the market. Novell, the leaders in PC networking, now own Digital Research, so things may change.

The original IBM PC had a minimum of 16K of memory, but this could be upgraded to 512K if necessary, and ran with a processor speed of 4.77MHz. Ten years later, in 1991, IBM were making PCs with 16Mb of memory, expandable to 64Mb, running with a processor speed of 33MHz. The cost of buying the hardware has come down considerably as the machines have become commodity items. Large companies are considering running major applications on PCs, something which, ten years ago, no one would have believed possible of a PC. In contrast, many computers in people's homes are just used to play computer games.

The widespread availability of computers has in all probability changed the world for ever. The microchip technology which made the PC possible has put chips not only into computers, but also into washing-machines and cars. Some books may never be published in paper form, but may only be made available as part of public databases. Networks of computers are already being used to make information available on a world-wide scale.

► Vocabulary

commodity items (l. 23) – items which can be produced and traded freely
non-proprietary (l. 24) – not belonging to any single company
capitalize on (l. 33) – profit from, turn to one's advantage

Task 6

When you read the text to decide on a title, which of the following did you do?

Did you:

- ☐ read the text slowly and try to understand every word?
- ☐ read quickly and try to understand the main theme?
- ☐ underline or mark sentences that you thought were important?
- ☐ make notes about important points?

Which of these reading strategies do you think is most appropriate for this kind of task? Which do you think is least appropriate?

Task 7

Answer these questions about the text.

1. How many mainframes did IBM think it was possible to sell in 1952?
2. How many PCs have now been sold?
3. Who paid for the initial research into PCs?
4. Which company later used the results of this research to develop their operating system?
5. What are command-based operating systems?
6. DR/DOS is an acronym. What does it stand for?
7. Since the invention of the IBM PC, many of its features have been improved. Which of the following features does the text *not* mention in this respect?
   a memory
   b speed
   c size
   d cost
8. Give three examples from the text of how the availability of computers has 'in all probability changed the world for ever'.

Task 8

Using the line references given, look back in the text and find words that have a similar meaning to:

1. international (lines 10–15)
2. contested (lines 15–20)
3. errors (lines 25–30)
4. paid for (lines 25–30)
5. buy (lines 45–50)
6. first (lines 60–65)
7. recommendation (lines 65–70)
8. improved (lines 75–80)

Writing

Task 9

Translate the sixth paragraph (starting 'The original IBM PC...') into your own language. Look carefully at the tenses before you start.

Speaking

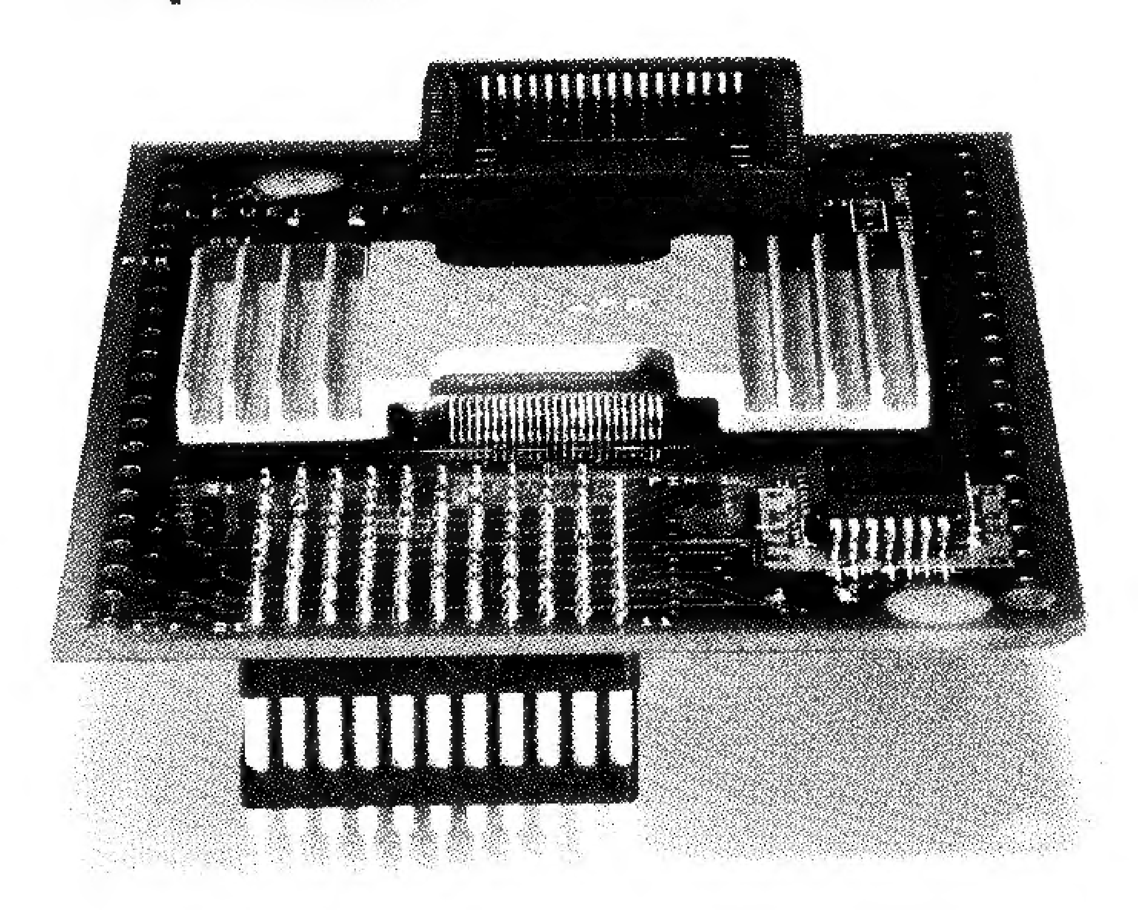
Task 10

The article states that 'many computers in people's homes are just used to play computer games'.

Discuss the following questions:

1. In what other ways are computers used at home, or outside work?
2. If you already have a PC, how do you use it? (If not, how would you use one?)

The processor



Reading

Task 11

Read this passage about the structure of the processor and fill in the gaps using the words below.

Structure of the processor

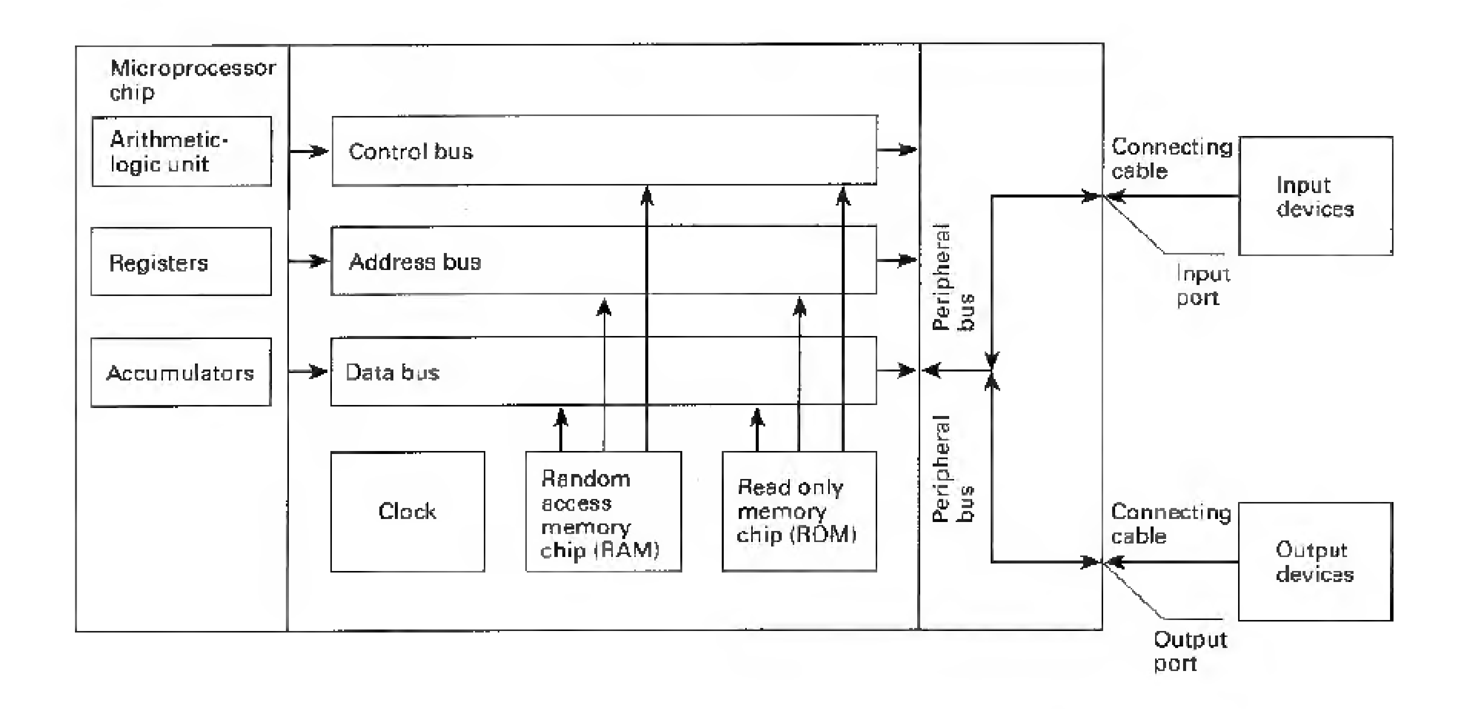
The processor consists of a [1] ____________, which is a circuit board on which are mounted [2] ____________ chips, memory chips, and other components linked together by [3] ____________ lines or channels in the form of control, address, and data [4] ____________. In addition, a processor has [5] ____________, which are electronic circuits providing specialized functions such as graphics, or which connect a system board to [6] ____________. The system board also consists of electronic devices, such as an electronic [7] ____________ for controlling the speed of operation; [8] ____________, which store numeric data during the course of processing; and various [9] ____________, including sequence control register, address register, and function register.

adaptor boards	*registers*	*microprocessor*
clock	*conductive*	*buses*
system board	*accumulators*	*input or output devices*

Reading

Task 12 Use the information in the reading passage and the diagram to help you match the terms below with the appropriate explanation or definition.

A processor consists of many different electronic circuits and devices for performing control functions, arithmetic and logic operations, and data transfers. Data may be transferred from backing storage to the internal memory or from the internal memory to the arithmetic unit by means of
5 conductive channels known as buses. The part of the processor which controls data transfers between the various input and output devices is called the control unit.



1	microprocessor chip	**a**	used to send address details between the memory and the address register
2	registers	**b**	consists of an arithmetic-logic unit, one or more working registers to store data being processed, and accumulators for storing the results of calculations
3	accumulators	**c**	a group of signal lines used to transmit data in parallel from one element of a computer to another
4	control bus	**d**	groups of bistable devices used to store information in a computer system for high-speed access
5	address bus	**e**	an electronic circuit, usually a quartz crystal, that generates electronic pulses at fixed time intervals to control the timing of all operations in the processor
6	data bus	**f**	used for storing part of the operating system and application software known as 'firmware'; can only be read; cannot be written to or altered in any way
7	clock	**g**	used to store numeric data during processing
8	RAM	**h**	a group of signal lines dedicated to the passing of control signals
9	ROM	**i**	used for the temporary storage of application programs and data; can be written to and read from

Speaking

Task 13

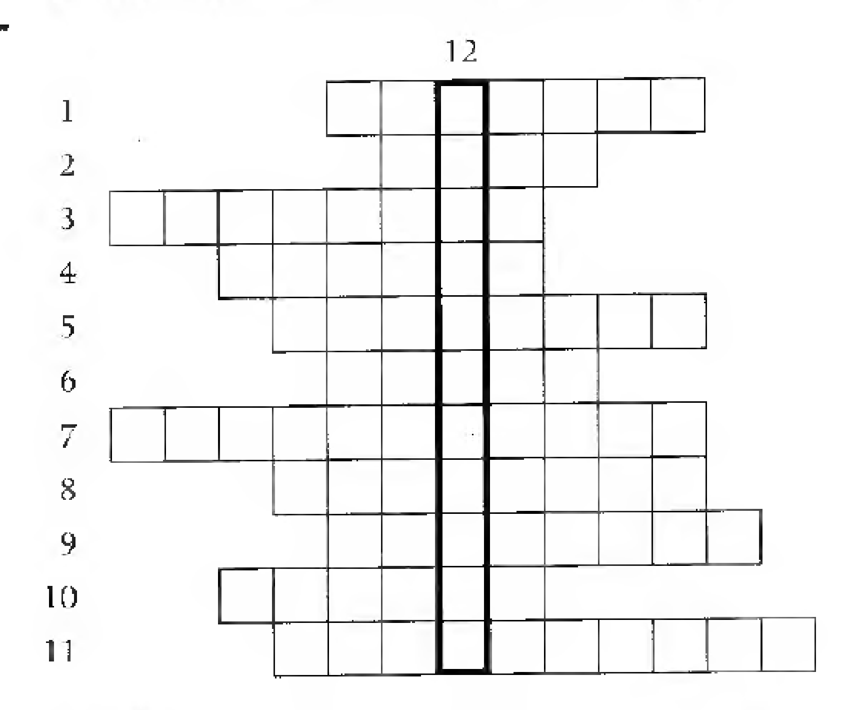
Work in pairs. Write down the list of terms (1–9) in Task 12 on a piece of paper. Without referring to your book, take turns to ask and answer questions about their functions.

▶ Useful expressions
What is/are . . .?
What does/do . . . do?

Word-play

Complete the puzzle and find the key word in 12 down.

Task 14



Across

1 A conductive line such as a data bus. (7)
2 A visual symbol used in a menu to represent a file or program. (4)
3 An input device used in computer games. (7)
4 An ____ device converts the electrical signals inside a computer into a form that can exist outside the computer. (6)
5 The name given to system software that is held in ROM. (8)
6 A device with one or more buttons used to point at locations on a computer screen. (5)
7 The part of the CPU that transmits co-ordinating control signals and commands to the computer. (7,4)
8 1,048,576 bytes. (8)
9 A large store of computerized data. (8)
10 The ____ system was first used commercially on the Apple Macintosh computer, but is now widely used on IBM machines. (7)
11 A signal route dedicated to sending information about locations within a computer. (7,3)

Down

12 A register containing the results of an operation performed by the arithmetic-logic unit. (11)

Language focus A

Contextual reference

Transitional markers are words used to link ideas together so that the text is easier to read. When pronouns such as *it, they, them, I, he, she, which, who, whose, that, such, one,* and demonstrative adjectives such as *this, that, these* and *those,* are used as transitional markers, they refer to a word, or words, mentioned earlier in the sentence or paragraph. Their function is to take your thoughts back to something that has already been mentioned. Other words which are often used to refer backwards are *the former, the latter, the first, second,* etc., *the last.*

Sample paragraph:

A computer, like any other machine, is used because it does certain jobs better and more efficiently than humans. It can receive more information and process it faster than any human. The speed at which a computer works means it can replace weeks or even months of pencil-and-paper work. Therefore, computers are used when the time saved offsets their cost, which is one of the many reasons they are used so much in business, industry, and research.

Exercise 1

Using the sample paragraph as a model, draw a rectangle around the word, or words, that the circled words refer to. Then join the ○ and the □ with arrows.

Modern accounting firms use spreadsheet software to do complicated calculations. They can provide their clients with an up-to-date report whenever it is needed. This software has many functions and can be integrated with other software. The spreadsheet's basic component is a cell. This may contain a formula which performs a mathematical operation. It could also contain a label or data. The former describes the information on the worksheet. The latter is the information itself.

The worksheet is the basic work area of a spreadsheet program. It is made up of cells arranged in rows and columns. The number of these varies depending on the software you are using. You can change the width and format of cells. Such parameters are usually quite easy to change with just a few keystrokes.

Exercise 2

Using the line reference given, look back at the reading passage in Unit 1, page 6 and find the reference for the words in *italics*.

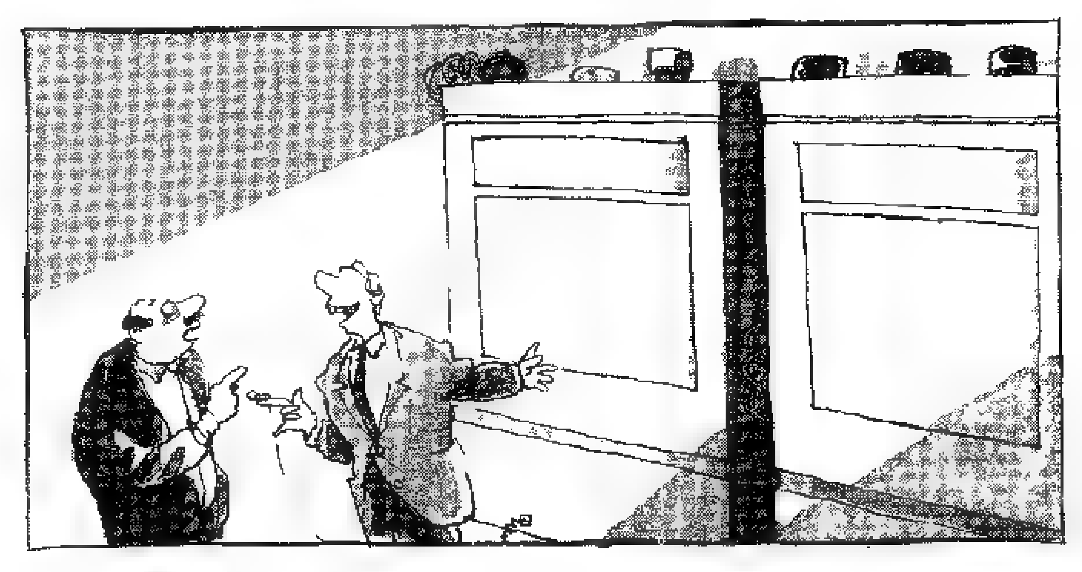
1 anyone can make *them* (line 25)
2 the ideas that *they* put (line 34)
3 *This* was a graphical interface (line 37)
4 *it* became the standard machine (line 44)
5 *these* are operating systems (line 50)
6 *it* has become a minor player (line 68)
7 *this* could be upgraded (line 76)



Portable computers



'This is the smallest, most powerful computer in the world.'



'Those? Those are the batteries.'

Start-up

Task 1

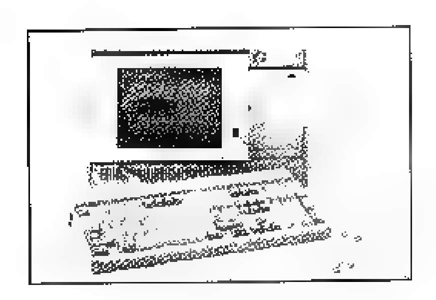
Discuss the following questions:

1 How small do you think computers can usefully become?
2 To what extent does the size of a computer influence what it can be used for? Think of examples to illustrate your answer.

Listening

Task 2

Listen to the following extract from a radio talk show called *Computerworks* in which the host talks with Sandra Cavanah a writer with a computer magazine. As you listen fill in the missing information about the various portable computers.



Portable

Power: runs on [1] ______

Weight: between 15 and [2] ______ pounds

Screen size: about ten inches diagonally

Input device: keyboard



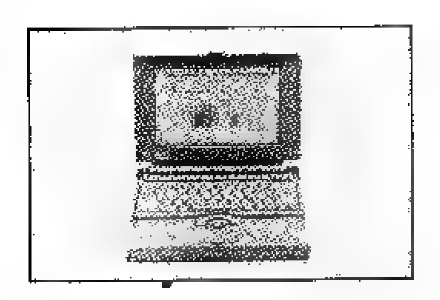
[3] ______

Power: runs on rechargeable [4] ______

Weight: generally between 8 and 15 pounds

Screen size: about [5] ______ diagonally

Input device: keyboard



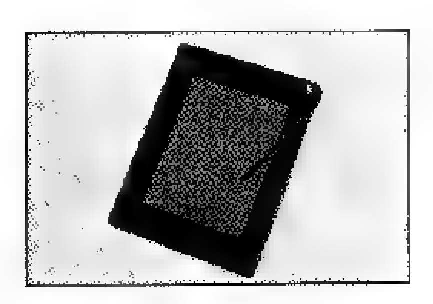
Notebook

Power: batteries

Weight: as little as [6] ______ pounds

Screen size: as small as [7] ______ inches

Input device: keyboard



Clipboard

Power: [8] ______ batteries

Weight: between [9] ______ and 6 pounds

Screen size: similar to notebook and laptop

Input device: [10] ______



[11] ______

Power: can operate on [12] ______ batteries

Weight: less than [13] ______

Screen size: very small

Input device: keys

Reading

Task 3

Before reading the text, match these words with their definitions:

a	clipboard	1	surface on which pictures or data are shown
b	stylus	2	electrical force
c	screen	3	pattern used as a guide for creating letters or characters
d	grid	4	individual dot on a computer screen
e	voltage	5	network of lines crossing at right angles
f	pixel	6	pointed implement for drawing or writing
g	template	7	portable board with a clip at the top for holding papers

Task 4

Read the text and decide why the author chose the title *Delete Keys*. Can you suggest a better title?

Delete Keys – Clipboard Technology

FOR THE LAST GENERATION, Silicon Valley and Tokyo have been working to design computers that are ever easier to use. There is one thing, however, that has prevented the machines from becoming their user-friendliest: you still have to input data with a keyboard, and that can require you to do a lot of typing and to memorize a lot of elaborate commands.

Enter the clipboard computer, a technology that has been in development for the last 20 years but took hold in the mass market only this year. Clipboard PCs which, as their name suggests, are not much bigger than an actual clipboard — replace the keyboard with a liquid crystal display (LCD) screen and an electronic stylus. Users input data by printing individual letters directly on the screen.

There are two technologies at work in a clipboard PC: one allows raw data to get into the computer and the other allows the computer to figure out what that data means. The first technology relies principally on hardware and varies depending on the particular computer. In one system, marketed under the name GRIDPad, the computer's LCD screen is covered by a sheet of glass with a transparent conductive coating. Voltage is sent across the glass in horizontal and vertical lines forming a fine grid; at any point on the grid, the voltage is slightly different. When the stylus — which is essentially a voltmeter — touches the screen, it informs the computer of the voltage at that point. The computer uses this information to determine where the stylus is and causes a liquid crystal pixel to appear at those coordinates. The position of the stylus is monitored several hundred times a second, so as the stylus moves across the glass, whole strings of pixels are activated.

'What we do is sort of connect the dots,' says Jeff Hawkins, the creator of GRIDPad. 'Users can then write whatever they want on the screen with a kind of electronic ink.'

Making that writing comprehensible to the computer, however, requires the help of some powerful software. When the stylus is being used, the computer is programmed to look for moments when the tip does not touch the screen for a third of a second or more. Every time this happens – and it happens a lot when somebody is printing – the software assumes that one letter or number has been written. The pixel positions of ▶

this fresh character are then passed on to the computer's pattern recognition software, which instantly identifies the letter or number written.

The software does this by first cleaning up the character smoothing out crooked lines and removing errant dots. The remaining lines and curves are then compared with a series of templates in the computer's memory that represent hundreds of thousands of different versions of every letter in the English alphabet and all ten numerals. When the computer finds the closest match, it encodes the character in memory and displays it on the screen as if it had been typed. The entire process takes just a fraction of a second. To delete a word, you simply draw a line through it. To move to the next page, you flick the stylus at the bottom of the screen as if you're flicking the page of a book.

There are a handful of clipboard computers now on the market, including GRIDPad, which is sold in the US, Penvision, manufactured by NCR and sold around the world: and Sony's Palmtop and Canon's AI Note, both sold only in Japan. IBM and Apple are also pouring millions of dollars into the technology.

In addition to this hardware, a variety of software is also making its way to the market. Depending on the power of the computer and the sophistication of the software, clipboard systems can be programmed to understand the particular quirks of a particular user's printing; this is an especially useful feature in Japan, where elaborate kanji characters make up most of the written language. Improvements in software may soon allow machines sold in the US to understand not only printing but continuous script as well.

Given such flexibility, the designers of clipboard computers are predicting big things – and a big market – for their products. 'There's no doubt about it,' says an optimistic Hawkins. 'You're going to own one of these things in the not-too-distant future.' ■

Vocabulary

printing (l. 73) – (in this case) writing separated letters or numbers by hand
kanji (l. 124) – Japanese script which uses Chinese characters

Task 5

Decide whether the following statements are true (T) or false (F) in relation to the information in the text. If you think a statement is false, change it to make it true.

1. ☐ The Americans and the Japanese are working together to produce user-friendlier computers.
2. ☐ The clipboard computer was first sold twenty years ago.
3. ☐ On a clipboard, an electronic pen replaces the traditional keyboard.
4. ☐ In the GRIDPad system, when the pen touches the screen, it informs the computer and a liquid crystal pixel appears at that point.
5. ☐ The software decides that one character or number is complete if the tip of the stylus is not in contact with the screen for more than half a second.
6. ☐ The whole process of recognizing letters or numbers and printing them on the screen takes very little time.
7. ☐ There are many clipboard computers sold today which are all available everywhere in the world.
8. ☐ Clipboard systems can be made to understand any kind of writing.

Task 6

Use the information in the text to complete the dialogue *in your own words.*

A How big is a clipboard PC?

B

A Does it have a keyboard?

B

A How does the stylus work?

B

A How does the computer know when one letter or number is complete?

B

A And how does the computer recognize different letters?

B

A Can you delete a word after you have written it?

B Yes

A Are these systems capable of recognizing joined writing?

B

Task 7

Using the line reference given, look back in the text and find the reference for the words in *italics*.

1. from becoming *their* user-friendliest (line 7)
2. *one* allows raw data to get (line 27)
3. *it* informs the computer (line 45)
4. Every time *this* happens (line 72)
5. *which* instantly identifies (line 79)
6. *it* encodes the character in memory (line 93)
7. *this* is an especially (line 122)
8. for *their* products (line 134)

Task 8

Using the line references given, look back in the text and find words or phrases that have a similar meaning to.

1. understand (lines 25–30)
2. sold (lines 30–35)
3. covering (lines 35–40)
4. points (lines 50–55)
5. join (lines 55–60)
6. making even (lines 80–85)
7. not straight (lines 80–85)
8. made by mistake (lines 85–90)
9. move quickly and sharply (lines 95–100)
10. unique features (lines 115–120)

Task 9

Choose the correct word to complete each sentence. You may have to change some words slightly.

1 *electron, electronic, electronics, electronically*

a An ______ pen is one example of an input device.

b A computer solves problems ______.

c Many ______ students go on to work as engineers.

2 *technology, technological, technologically, technologist*

a The computer is the greatest ______ invention of the twentieth century.

b There are two ______ involved in a clipboard PC.

c Today's computers are ______ far superior to those used a few years ago

3 *identify, identifying, identifiable, identity*

a The clipboard's pattern recognition software immediately ______ the letters and numbers written by the stylus

b Most computer companies will not allow people without an ______ card to enter their premises

c A password is a mechanism for ______ the computer-user and allowing access.

4 *compute, computing, computation, computerize, computerization*

a The ______ of the manufacturing division will be expensive in the short term but cost-effective in the long term.

b We should be able to ______ our profit for next year fairly accurately with the new program

c I could tell from all the ______ on the board that a maths lesson was in progress.

Writing

Task 10

Translate the third paragraph (starting 'There are two technologies...') into your language. Check the meaning of any unfamiliar technical words in the glossary at the back of this book

Speaking

Task 11

Discuss the following questions:

1 What are the limitations of portable computers?
2 Do you think students should be allowed to use portable computers in class?

CF-170 Notebook Computer. Just the right size and specification from Panasonic.



Technical features

Panasonic

Write an advertisement for a real or imaginary notebook computer. Your material should include its name and type, its size, price, and capacity, and the features that make it superior to other models.

You may base your material on the advertisement above, but do not copy straight from the text.

Speaking

Task 13

Work in pairs.

Student A: You are a sales representative trying to sell your company's notebook computer. You are presenting your product to the Sales Director of a manufacturing company which is thinking of buying 30 notebook computers for the sales staff. Decide on the specifications and complete the table below. Then try to persuade the Sales Director to buy your product.

Name	________
Type (size)	________
Processor type	________
Operating speed	________
Memory	________
Display	________
Power supply	________
Cost	________
Other features	

▶ Useful expressions
It costs...
It runs/operates on.
It weighs. .

Student B: You are the Sales Director of a manufacturing company. You are considering buying 30 notebook computers for your sales staff. Find out about all the specifications of the model on offer. Decide whether it is suitable for your needs

▶ Useful expressions
How much does it cost?
What power source does it use?
How big/heavy is it?

Operating systems

Reading

Task 14

Before you read the text, try to answer the following questions:

1 What is an operating system and what is its purpose?
2 Where is an operating system stored and how is it transferred to internal memory?
3 List some of the tasks typically performed by an operating system.

Now read the text and check your answers.

General features of operating systems

An operating system is a master control program which controls the functions of the computer system as a whole and the running of application programs. All computers do not use the same operating systems. It is therefore important to assess the operating system used on a particular model before initial commitment because some software is only designed to run under the control of specific operating systems. Some operating systems are adopted as 'industry standards' and these are the ones which should be evaluated because they normally have a good software base. The reason for this is that software houses are willing to expand resources on the development of application packages for machines functioning under the control of an operating system which is widely used. The cost of software is likely to be lower in such circumstances as the development costs are spread over a greater number of users, both actual and potential.

Mainframe computers usually process several application programs concurrently, switching from one to the other, for the purpose of increasing processing productivity. This is known as multiprogramming (multi-tasking in the context of microcomputers), which requires a powerful operating system incorporating work scheduling facilities to control the switching between programs. This entails reading in data for one program while the processor is performing computations on another and printing out results on yet another.

In multi-user environments an operating system is required to control terminal operations on a shared access basis as only one user can access the system at any moment of time. The operating system allocates control to each terminal in turn. Such systems also require a system for record locking and unlocking, to prevent one user attempting to read a record whilst another user is updating it, for instance. The first user is allocated control to write to a record (or file in some instances) and other users are denied access until the record is updated and unlocked.

Some environments operate in concurrent batch and real-time mode. This means that a 'background' job deals with routine batch processing whilst the 'foreground' job deals with real-time operations such as airline seat reservations, on-line booking of hotel accommodation, or control of warehouse stocks, etc. The real-time operation has priority, and the operating system interrupts batch processing operations to deal with real-time enquiries or file updates. The stage of batch processing attained at the time of the interrupt is temporarily transferred to backing storage. After the real-time operation has been dealt with, the interrupted program is transferred back to internal memory from backing storage, and processing recommences from a 'restart' point. The operating system also copies to disk backing storage the state of the real-time system every few minutes (periodic check points) to provide a means of 'recovering' the system in the event of a malfunction.

An operating system is stored on disk and has to be booted into the internal memory (RAM) where it must reside throughout processing so that commands are instantly available. The operating system commands may exceed the internal memory capacity of the computer in which case only that portion of the OS which is frequently used is retained internally, other modules being read in from disk as required. Many microcomputers function under the control of a disk operating system known as DOS.

Task 15 Answer these questions about the text.

1. Why is it important to assess the operating system on a computer before buying it?
2. What is multiprogramming?
3. The text gives some examples of real time processing. Can you think of some examples of batch processing?

Task 16 Here is a list of typical tasks performed by an operating system. In each case the main verb has been omitted. Fill in the blanks from the words given. Sometimes more than one may apply

A typical operating system will

1. ______ input and output devices.
2. ______ the status of hardware devices.
3. ______ hardware interrupts
4. ______ new disks
5. ______ disk directories.
6. ______ disk reading and writing operations.
7. ______ disk errors.
8. ______ disk commands relating to the deletion, copying, renaming, and dumping of files.

execute
monitor
format
diagnose

Task 17 Match these common DOS commands with the appropriate explanation.

1	BACKUP	a	searches for a specific string of text in a file.
2	CHDIR or CD	b	allows a text file from the current directory to be displayed on screen
3	CHKDSK	c	allows the user to change the name of a file.
4	CLS	d	saves the contents of the hard disk to a floppy disk for security purposes.
5	DEL	e	is used when it is necessary to change the current directory.
6	DIR.SORT	f	clears data from the screen.
7	REN	g	alphabetically sorts and lists a disk directory.
8	TYPE	h	makes back-up copies of the contents of one disk to another.
9	FIND	i	deletes a specified file from the current directory, specified drive, or specified path.
10	DISKCOPY	j	produces a status report of the currently logged-on disk, indicating the amount of disk space used, the available capacity (in bytes), and the number of files on disk.

Word-play

Task 18

Find the hidden words in this square. Some appear vertically, some horizontally, and some diagonally. They may be upside-down or back to front. Use the clues below to help you. The number of letters in each word and the first letter of the word appear in brackets after the clue. The first one has been done for you.

C T A A R I T P L R

L P N I P I D A E E

I I E A E E B I X T

P R T D L A F M I E

B R E E S N O I P M

O E T G R I D O T P

A E C V K I M P Y L

R N D S T Y L I S A

D E L V E I Y S T T

T P I R R E T N I F

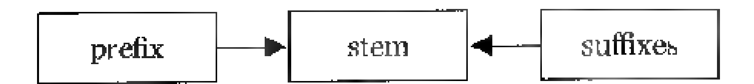
Find words which mean:

1. a computer that is small enough to hold in the hand. (7, P)
2. an electronic pen. (6, S)
3. to erase or omit. (6, D)
4. one type of portable computer which operates with an electronic pen. (9, C)
5. the information that the computer processes. (4, D)
6. a network of lines crossing at right angles. (4, G)
7. a signal to a processor to suspend temporarily the current sequence of instructions. (9, I)
8. a pattern used as a guide for creating letters or characters. (8, T)
9. an individual dot on a computer screen. (5, P)

Language focus B

Word formation: prefixes

When you are reading, you will come across unfamiliar words. It is often possible to guess the meanings of these words if you understand the way words in English are generally formed.



An English word can be divided into three parts: a prefix, a stem, and a suffix. *Pre-* means 'before'. A prefix, therefore, is what comes before the stem. Consider, as an example, the prefix *de-* (meaning 'reduce' or 'reverse') in a word like **demagnetize** (meaning 'to deprive of magnetism'). A suffix is what is attached to the end of the stem. Consider, as an example, the suffix *-er* (meaning 'someone who') in **programmer** ('a person who programs').

Suffixes change the word from one part of speech to another. For example, *-ly* added to the adjective *quick* gives the adverb *quickly*. Prefixes, on the other hand, usually change the meaning of the word. For example, *un-* changes a word to the negative. **Unmagnetizable** means 'not capable of being magnetized'.

Let us now consider some prefixes, their usual meanings, and how they change the meanings of English words.

Prefixes

Negative and positive	Size	Location	Time and order	Number
un-	semi-	inter-	pre-	mono-
non-	mini-	super-	ante-	bi-
in-	micro-	trans-	fore-	hex-
dis-		ex-	post-	oct-
re-		extra-		multi-
		peri-		

Exercise 1 Study these tables. Try to find additional examples, using your dictionary if necessary.

1 **Negative and positive prefixes:**

	Prefix	Meaning	Examples
Negative	un-	not	unmagnetized
	in-		incomplete
	im		impossible
	il-		illegal
	ir-		irregular, irrelevant
	non-	not connected with	non-programmable,
	mis-	bad, wrong	misdirect
	mal-		malfunction
	dis-	opposite feeling	disagree
		opposite action	disconnect
	anti-	against	antiglare
	de-	reduce, reverse	demagnetize, decode
	under	too little	underestimate
Positive	re-	do again	reorganize
	over-	too much	overload

2 **Prefixes of size:**

Prefix	Meaning	Examples
semi-	half, partly	semiconductor
equi-	equal	equidistant
mini-	small	minicomputer
micro-	very small	microcomputer
macro-	large, great	macroeconomics
mega-		megabyte

3 **Prefixes of location:**

Prefix	Meaning	Examples
inter	between, among	interface, interactive
super-	over	supersonic
trans-	across	transmit, transfer
ex	out	exclude, extrinsic
extra-	beyond	extraordinary
sub-	under	subschema
infra	below	infra-red
peri	around	peripheral

4 **Prefixes of time and order:**

Prefix	Meaning	Examples
ante- } pre- }	before	antecedent prefix
prime-	first	primary, primitive
post	after	postdated
retro	backward	retroactive

5 **Prefixes of numbers:**

Prefix	Meaning	Examples
semi	half	semicircle
mono	one	monochromatic
bi-	two	binary
tri-	three	triangle
quad-	four	quadruple
penta-	five	pentagon
hex	six	hexadecimal
sept(em)-	seven	September
oct-	eight	octal
dec-	ten	decimal
multi	many	multiplexor

6 **Other prefixes:**

Prefix	Meaning	Examples
pro-	before, in advance	program
	forward	progress
auto-	self	automatic
co- } con }	together, with	co-ordinate connect

Exercise 2

Read the following sentences and circle the prefixes. For each word that has a prefix, try to decide what the prefix means. Refer back to the table if you need help.

1 Floppy disks are inexpensive and reuseable.
2 If a printer malfunctions you should check the interface cable.
3 The multiplexor was not working because someone had disconnected it by mistake.
4 Improper installation of the antiglare shield will make it impossible to read what is on the screen.
5 After you transfer text using the 'cut and paste' feature, you may have to reformat the text you have inserted.
6 You can maximize your chances of finding a job if you are bilingual or even trilingual.

7 Peripheral devices can be either input devices (such as keyboards) or output devices (such as printers).
8 Your pay rise is retroactive to the beginning of June and you will receive a bi-annual bonus.
9 The octal and hexadecimal systems are number systems used as a form of shorthand in reading groups of four binary digits
10 As the results are irregular the program will have to be rewritten.

Exercise 3 Fill in the gaps with the correct prefix from the following list.

auto	de	dec	inter
maxi	mega	micro	mini
mono	multi	semi	sub

1 Most people prefer a colour screen to a ____ chrome screen.
2 ____ script is a character or symbol written below and to the right of a number or letter, often used in science
3 A ____ byte equals approximately one million bytes
4 Once you finish your program, you will have to test it and ____ bug it to remove all the mistakes
5 The introduction of ____ conductor technology revolutionized the computer industry.
6 If a computer system has two or more central processors which are under common control, it is called a ____ processor system.
7 The ____ imal system is a number system with a base of 10.
8 When the user and the computer are in active communication on a graphics system, we refer to this as ____ active graphics.



Online services



Start-up

Task 1

Discuss the following questions:

1 What online services are available in your country?
2 What kind of facilities do online services provide?

Reading

Task 2

Decide whether the following statements are true (T) or false (F) in relation to the information in the text which follows. If you think a statement is false, change it to make it true.

1 ☐ Most people choose an online service because of the price or the number of available files.
2 ☐ Everybody has one service which he/she likes more than all the others.
3 ☐ You should judge each service according to whether it is better or worse overall than the service you are currently using.
4 ☐ Eventually, all services will be accessible from the service you are using.
5 ☐ McGraw-Hill is owned by BIX
6 ☐ Tammy Ray and Jeanette Shearer think the BIX service is average.
7 ☐ French Minitel users have free access to an English language version of CompuServe, although they cannot use the e-mail facility.
8 ☐ DELPHI's Hobby Shop now has two special-interest areas: one on classic vehicles, and one on new cars and technology.

Online Services

I'm frequently asked which online service is 'best', but the answer is there is no best. Rating a particular service over another is entirely subjective. Price is important to some people, while the number of files available for download is important to others. Because of these and so many other different judgments, there can be no absolute. It all comes down to individual needs and preferences.

Still, users tend to be fiercely loyal to their 'home' online service – which is usually the first online service they ever used. They tend to judge all other online services based on this first service – often preventing themselves from seeing the advantages of a specific service. For my part, I like all the services I use and I'm on two dozen.

Each offers one or more products or features that either do not exist elsewhere or are superior to the same features on other services. And I've a really subjective reason for being on one service – I use it to send monthly articles to magazines in Japan.

So, the real answer to the question is simple: the best online service is the service that has what you want and is easy for you to use. The point? Keep an open mind when checking out an online service. Judge it based on what it offers and how it meets your needs – not in comparison to what you're used to using. (It takes a couple of sessions to shake preconceived notions of what an online service 'should' be.)

Eventually, we're all going to be interlinked, no matter which service we use, in what DIALOG's Richard Ream calls a 'network of networks'. Until then, most of us have to go to more than one service to find everything we need.

And now, the news ...

What's new on-line

BIX

TAB Book Clubs Online: You've probably seen magazine ads for The Computer Book Club and The Computer Professionals' Book Society. These are sponsored by TAB Books. This division of McGraw-Hill (BIX's parent company) is now online on BIX, taking orders and answering questions from members and prospective members. The club conference is moderated by Tammy Ray and Jeanette Shearer. You can check them out by typing JOIN TAB.BOOK.CLUBS.

CompuServe

Dell Computer Forum: Dell Computer Corporation has opened a product support area on CompuServe. The Dell area is part of the PC Vendor D Forum. Type GO DELL or GO PCVEND to take a look.

Minitel Link to CompuServe

CompuServe bolstered its position in Europe by making some of its services available via France's national Minitel system in July. French Minitel users have access to an extra-cost service that is essentially a 'limited edition', English-language version of CompuServe. Among the services available are software and database downloads. E-mail and message-base posting are not available to Minitel users.

DELPHI

Hobby Group Expands: DELPHI's Hobby Shop special-interest group continues to expand its areas of interest. The most recent additions to the database and group topics are Antique Auto, which focuses on classic vehicles, and Autotech, where you can learn about new cars and technology. Type Go GROUP.

▶ Vocabulary

It all comes down to (l. 10) – It is a question of
two dozen (l. 20) – about twenty-four
checking out (l. 33) – examining
is moderated by (l. 58) – is run by
bolstered (l. 68) – strengthened

Task 3

Fill in the gaps in this summary of the first part of the text. Each clue is an anagram. The first and last letters are correct.

In my opinion, there is no single 'best' online service The choice depends on your [1] ________ (prltacuair) needs and preferences. Most users have their own [2] ________ (ftrvaioue), but this can prevent them from seeing the [3] ________ (agtvndaaes) of other services. Each one offers something which is either [4] ________ (uqinue) to that service, or which is [5] ________ (bteetr) than the same features on other services. So, when considering an online service, decide whether its features [6] ________ (cosrernopd) to what you need Until all services are [7] ________ (iilktneernd), most of us will need to [8] ________ (cunoitne) using more than one.

Task 4

1 Do you think the English in the text is:
  - **a** formal?
  - **b** neutral?
  - **c** informal?

2 Do you think this article originally appeared in:
  - **a** a computer magazine?
  - **b** a general magazine for young people?
  - **c** a general magazine for adults?
  - **d** an online bulletin board?
  - **e** the science page of a newspaper?

Give reasons for your choices.

Task 5

Make these words negative by adding the appropriate prefix from those given below. The first one has been done for you.

in- un- im- dis-

1 *in*frequently
2 ____ loyal
3 ____ advantages
4 ____ specific
5 ____ like
6 ____ real
7 ____ probably
8 ____ available

Task 6

Match each word or expression in the first column with a synonym in the second column.

1	but (line 2)	**a**	ultimately
2	while (line 6)	**b**	however
3	still (line 12)	**c**	whereas
4	for my part (line 19)	**d**	nevertheless
5	eventually (line 40)	**e**	personally
6	until then (line 44)	**f**	meanwhile

Listening

Task 7 Listen to Jean-Yves Martin, a sales representative of France Telecom, explaining the Minitel online service to Paul Burgess, an English reporter. Complete Paul's notes.

Description

Online service linking terminals in homes to the telephone network – 'a telephone you can write with.'

Examples of Minitel services

1 weather forecasts
2 ______
3 home-shopping services
4 ______
5 'Minitel rose'

Advantages of system

1 cheap
2 ______
3 ______

Original disadvantages

1 primitive graphics
2 ______
3 ______

Possible future developments

1 addition of ______ to the system (for bank and stock-market transactions from the home)
2 ______ linked on broadband radio channels (for use in cars)

Task 8 Answer these questions about the interview.

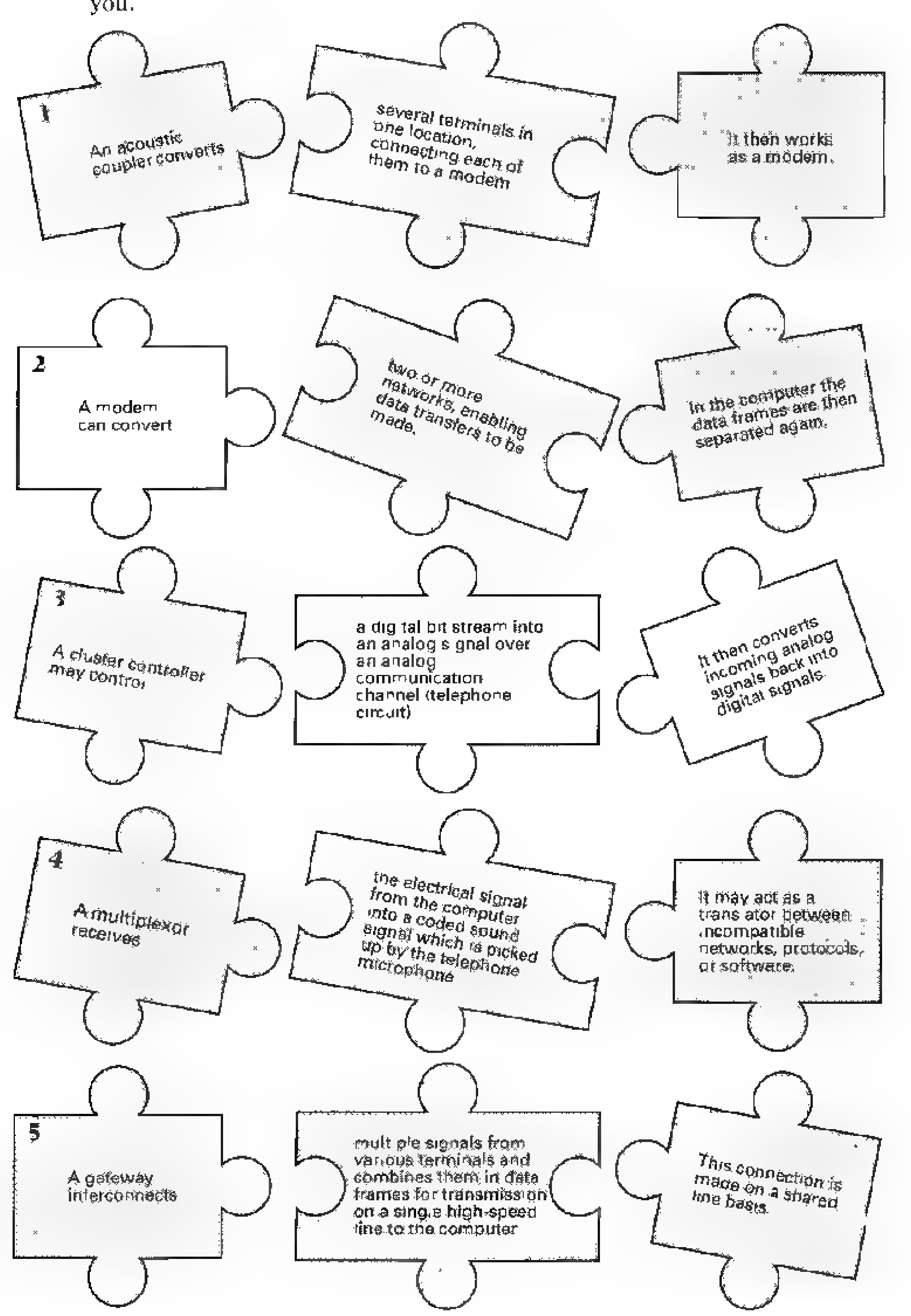
1 What is 'Minitel rose'?
2 When did the system start?
3 How many Minitel terminals did the PTT install originally?
4 Did the first users have to pay?

Data transmission

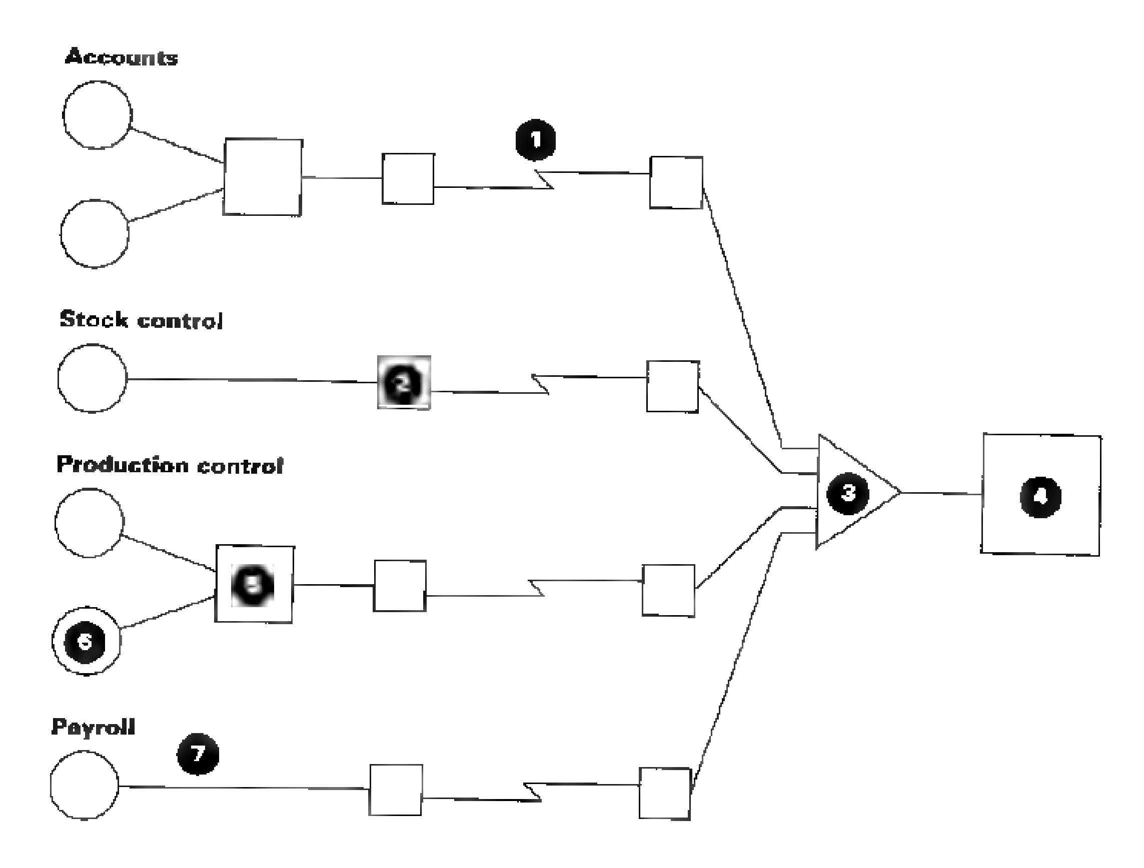
Reading

Task 9

Match up the jigsaw pieces to complete the definitions. One has been done for you.



Task 10 Using the completed definitions from Task 9 and the information in the text below, fill in the gaps in this diagram.



1 ________ signals

2

3

4

5

6

7 ________ signals

Analog transmission

The older telephone systems function on the basis of analog signals representing voice modulation patterns which are represented by variations in wave forms. When using telephone lines for transmitting data by terminal to a computer, the digital signals from the terminal need 5 to be converted to analog signals by an acoustic coupler or modem prior to transmission. A modem is a device which serves a dual purpose because it acts as a MOdulator (digital to analog) and DEModulator (analog to digital), hence the name MODEM. An analog communication system requires a modem at either end of the communication line. When the 10 signals are received by the distant computer, the signals are reconverted to digital form prior to being input for processing

Reading

Task 11

Before reading the text below, answer these questions.

1 What are the advantages of digital transmission?
2 How does digital transmission differ from analog transmission?
3 What information does the code supply?

Now read the text to check your answers.

Digital transmission

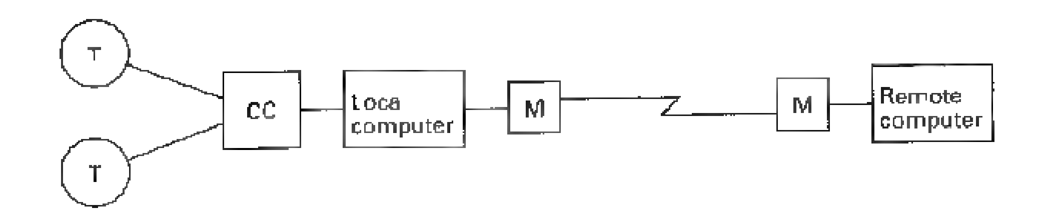
Analog transmission has been in use for many years as the basis of telephone technology and is very effective for this purpose but it is not so suitable for high-speed transmission of information. Digital transmission consists of electrical pulses representing data in binary code as a series of on off pulses. A number of different codes exist some of which are based on a 6-, 7-, or 8-bit structure. ASCII is a 7-bit code and EBCDIC is an 8-bit code The codes represent characters, transmission control signals, information separators, and device control. Digital technology has a number of advantages compared to analog, including higher transmission speed, lower incidence of errors, and the facility for mixing data consisting of voice, image, and text on the same circuit It is for this reason that data transmissions will be increasingly digital in the future. A network structure known as Integrated Services Digital Network (ISDN) facilitates these aspects.

Speaking

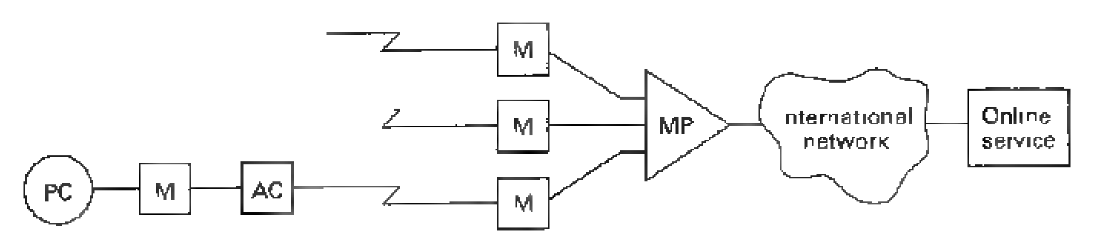
Task 12

Work in pairs, **A** and **B** Use the information in this unit to describe the diagrams below You may make notes first.

Student A: Describe diagram 1 to your partner.



Student B: Describe diagram 2 to your partner.



AC – Acoustic coupler
CC – C uster control er
M Modem
MP Multip exor
PC – Persona computer
T Termina

Writing

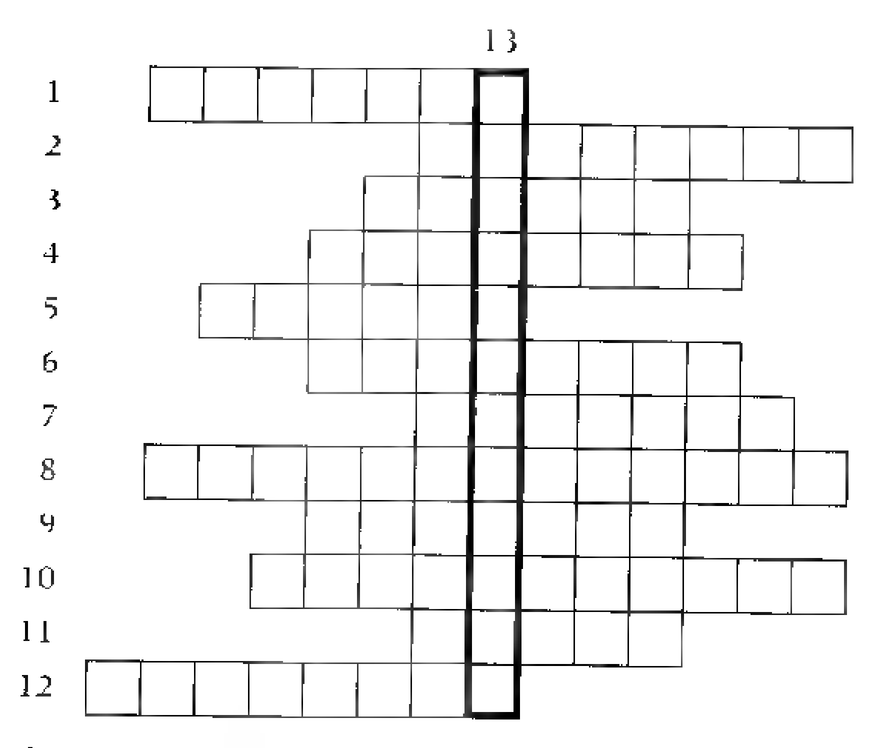
Task 13

Write a paragraph to show the difference between analog and digital transmission.

Word-play

Task 14

Complete the puzzle and find the key word in 13 down.



Across

1 A combination of electronic devices and conductors that form a conducting path. (7)

2 An agreement that covers the procedures used to exchange information between co-operating computers. (8)

3 This kind of transmission has been the basis for telephone technology for many years, though it is gradually being replaced. (6)

4 To send programs or data from a central computer to a remote PC. (8)

5 Single vibrations of electric current. (7)

6 A VDU screen and keyboard used to interact with a computer, usually with no computing capacity of its own. (8)

7 This kind of transmission consists of electrical signals representing data in binary code. (7)

8 A public database, for example, that can be accessed over a computer or telephone network. (6,7)

9 A ____ controller controls a number of similar peripheral device such as terminals and links them to the main computer. (7)

10 This merges information from several channels into one channel. (11)

11 A device that converts the computer's digital bit stream into an analog signal for transmission over a telephone line. (5)

12 A ____ board is a public teleconferencing system that allows users to read and write messages. (8)

Down

13 The process of sending signals electronically. (12)

Language focus C

Word formation: suffixes

We have already seen how prefixes can change the meaning of a word. Let us now consider some suffixes their usual meanings, and how they change the meanings of English words.

Suffixes

Nouns	Verbs	Adjectives	Adverbs
-ance	-ize	-able	-ly
-ence	-ate	-ible	
-or	-fy	-less	
-er	-en	-ic	
-ist	-ify	-ical	
-ness		-ish	
		-ive	

Exercise 1

Study these tables and try to make additional examples. Use your dictionary if necessary.

1 **Noun-forming suffixes:**

Suffix	Meaning	Examples
-ance	state	performance
-ence	quality of	independence
-er, -or	a person who a thing which	programmer, operator compiler, accumulator
-ist, -yst	a person who	analyst, typist
-ian	pertaining to	electrician
-tion, -ation	the act of	compilation
-ness	condition of	readiness
-ion	action, state	conversion
-ing	activity	multiplexing
-ment	state, action	measurement
-ity	state, quality	electricity
-ism	condition state	magnetism
-dom	domain, condition	freedom
-ship	condition state	relationship partnership

2 **Verb-forming suffixes:**

Suffix	Meaning	Examples
-ize -ise	to make	computerize
-ate		automate, activate, calculate
-ify		simplify
-en		harden, widen

3 **Adverb-forming suffix:**

Suffix	Meaning	Examples
-ly	in the manner of	electronically, logically, comparably, helpfully

4 **Adjective-forming suffixes:**

Suffix	Meaning	Examples
-al	having the quality of	computational, logical
-ar		circular
-ic		magnetic, automatic
-ical		electrical
-able	capable of being	comparable
-ible		divisible
-ous	like, full of	dangerous
-ful	characterized by	helpful
-less	without	careless
-ish	like	yellowish
-ed	having the quality of	computed
-ive		interactive

Note. Words ending in *-ing* are formed from verbs. The *-ing* form may be used as a noun, part of a noun phrase or part of a verb.

Examples:

1 ***Programming*** *is an interesting job.* (noun)
2 ***Programming*** *in C is interesting.* (part of noun phrase)
3 *He is **working** as a programmer.* (part of verb)

Exercise 2

Read the following sentences and circle the suffixes. Underline the stem if it can be used on its own. The first one has been done for you.

1 A programmer designs, writes, and tests programs for performing various tasks on a computer.
2 A systems analyst studies organizational systems and decides what action needs to be taken to maximize efficiency.

3 Laser printers are preferable to other types of printing devices because of their speed and quietness.
4 The microcomputer we have purchased does not have a FORTRAN compiler. It is programmable in BASIC only.
5 We have found that operators who have the freedom to take short breaks during the day greatly improve their performance.
6 The number of shipments will increase over the coming months.
7 We decided to computerize the entire plant to give each division more independence.
8 Spooling is a way of storing data temporarily on disk or tape until it can be processed by another part of the system.
9 Turning your office into a paperless environment may be expensive at the beginning but can produce big savings in the long run.
10 Software developers are producing increasingly sophisticated applications for a growing global market.

Now, for each word that has a suffix, indicate what part of speech the word is (e.g. noun, verb, etc.).



Programming and languages

Start-up

Task 1

Can you identify these programming languages?

a

```
/* this program finds the minimum of two integers */

        #include <stdio.h>

        main()
        {
          int j,k,m;

        printf("Input two integers: ");
        scanf("%d%d",&j,&k);
        m=min(j,k);

        printf("\n%d is the minimum of %d and %d\n\n",
          m,j,k);
        }
```

b

```
1740  REM ******************************
1750  REM Capture a arm data
1760  REM ******************************
1770  CLS
1780  SCREEN 1
1790  C  OR BALK,PALL
1800  LOCATE 1,1
18 0  INPUT "A arm time  ",AT$
1820  AC$ = MID$(AT$,3,1)
1830  AH$ = MID$(AT$,1,2)
1840  AM$ = MID$(AT$,4,2)
1850  IF AC$ <> ":" GOTO 1770
1860  IF LEN (AT$) <> 5 GOTO 1770
1870  AH% = VAL(AH$)
1880  AM% = VAL(AM$)
1890  IF AH% > 23 GOTO 1770
1900  IF AM% > 59 GOTO 1770
19 0  LOCATE 2,1
1920  INPUT "Alarm text: ",ATEXT$
1930  IF LEN (ATEXT$) > 3  THEN  0   19 0
1940  ASN% =
1950  LSET FAH$ = MKI$(AH%)
1960  LSET FAM$ = MKI$(AM%)
1970  LSET FATEXT$ = ATEX $
1980  LSET FASN$ = MKI$ (ASN%)
1990  PUT #2,1
2000  CLS
2010  GOTO 2770
```

c

```
092900 B700-CONVERT-RBO-DATE SECTION
093000*
093100*    IF CREDIT HAS NOT BEEN GIVEN ON A TRANSACTION, THE
093200*    DATE IN IT IS THE TRANSACTION DATE. THIS SECTION
093300*    CONVERTS THE TRANSACTION DATE TO A NUMBER OF DAYS
093400*    SINCE 1900, PUTTING THE RESULT IN WS CALC DATE
093500*
093600 B700-010
093700*
093800    MOVE RBO-DTTRAN          TO WS DATE N
093900    MOVE WS-DATE-X           TO FLD-AREA.
094000    MOVE NORM-MDY-INPUT      TO N01 USER-FIELDS
094100    MOVE ZEROS               TO NORMALIZER BUFFER
094200                                N01 NBR-DAYS.
094300    CALL "XZXEFTB" USING TWAR
094400                         N01 ARG LIST
094500                         FLD AREA
094600                         NORMALIZER-BUFFER
094700    IF NOT RTN-CODE          NOT EQUAL TO ZEROS
094800         DISPLAY "B200: DATE CONVERSION FAIL, CODE,
094900                  NOT-RTN-CODE.
095000    MOVE DAYS-SINCE 1900 TO WS CALC DATE.
095100*
095200 B700 090
095300*
095400    EXIT.
```

Reading

Task 2

Before reading the text, try to fill in the gaps in these sentences

1 A ______ is a program written in one of the high level languages.

2 A program written in a high-level language must be interpreted into ______ before the computer will read and process it.

3 A program designed to perform a specific task is called an ______.

4 The ______ or ______ is the program produced when the original program has been converted into machine code.

5 A ______ is a program that converts a high-level language into machine code

6 The systems program which fetches required systems routines and links them to the object module is known as the ______

7 The ______ is the program directly executable by the computer.

Now read the text to check your answers.

Programs and programming languages

Computers can deal with different kinds of problems if they are given the right instructions for what to do. Instructions are first written in one of the high-level languages, e.g. FORTRAN, COBOL, ALGOL, PL I, PASCAL, BASIC, or C, depending on the type of problem to be solved. A program
5 written in one of these languages is often called a source program, and it cannot be directly processed by the computer until it has been compiled, which means interpreted into machine code. Usually a single instruction written in a high-level language, when transformed into machine code, results in several instructions. Here is a brief description of some of the
10 many high-level languages:

FORTRAN acronym for FORmula TRANslation This language is used for solving scientific and mathematical problems. It consists of algebraic formulae and English phrases. It was first introduced in the United States in 1954.

15 **COBOL** acronym for COmmon Business-Oriented Language. This language is used for commercial purposes. COBOL, which is written using English statements, deals with problems that do not involve a lot of mathematical calculations It was first introduced in 1959

ALGOL acronym for ALGOrithmic Language Originally called IAL,
20 which means International Algebraic Language. It is used for mathematical and scientific purposes. ALGOL was first introduced in Europe in 1960.

▶

PL/I Programming Language I. Developed in 1964 to combine features of COBOL and ALGOL. Consequently, it is used for data processing as well as scientific applications.

BASIC acronym for Beginner's All-purpose Symbolic Instruction Code. Developed in 1965 at Dartmouth College in the United States for use by students who require a simple language to begin programming.

C developed in the 1970s to support the UNIX operating system. C is a highly portable general purpose language.

Other such languages are APL (developed in 1962), PASCAL (named after Blaise Pascal and developed in 1971), and LISP and PROLOG, both of which are used for work in artificial intelligence. LOGO is a development of LISP which has been used to develop computer based training (CBT) packages.

When a program written in one of these high-level languages is designed to do a specific type of work such as calculate a company's payroll or calculate the stress factor on a roof, it is called an applications program. Institutions either purchase these programs as packages or commission their own programmers to write them to meet the specifications of the users.

The program produced after the source program has been converted into machine code is referred to as an object program or object module. This is done by a computer program called the compiler, which is unique for each computer. Consequently, a computer needs its own compiler for the various high level languages if it is expected to accept programs written in those languages. For example, in order that an IBM RS 6000 may process a program in FORTRAN, it needs to have a compiler that would understand that particular model and the FORTRAN language as well.

The compiler is a systems program which may be written in any language, but the computer's operating system is a true systems program which controls the central processing unit (CPU), the input, the output, and the secondary memory devices. Another systems program is the linkage editor, which fetches required systems routines and links them to the object module (the source program in machine code). The resulting program is then called the load module, which is the program directly executable by the computer. Although systems programs are part of the software, they are usually provided by the manufacturer of the machine.

Unlike systems programs, software packages are sold by various vendors and not necessarily by the computer manufacturer. They are a set of programs designed to perform certain applications which conform to the particular specifications of the user. Payroll is an example of such a package which allows the user to input data – hours worked, pay rates, special deductions, names of employees – and get salary calculations as output. These packages are coded in machine language (0s and 1s) on magnetic tapes or disks which can be purchased, leased, or rented by users who choose the package that most closely corresponds to their needs. ■

Vocabulary

payroll (l. 62) – list of employees and the amount of money to be paid to each of them

Task 3

These are answers to questions about the text. Write the questions.

1 No, it is quite wordy so it is used for commercial purposes.
2 To support the UNIX operating system.
3 An applications program.
4 It is done by the compiler.
5 It fetches required systems routines and links them to the object module
6 No they are also sold by other vendors.

Task 4

Summarize the information on different high-level computer languages by completing the table below.

Language	Developed	Function	Characteristic
FORTRAN			
	1959		
		mathematical and scientific purposes	
			combines features of COBOL and ALGOL
BASIC			
		to support Unix operating system	
	1962		

Task 5

Find the passages in the text where the following ideas are expressed. Give the line references.

line

1 l. Systems programs control the work of the computer system.
2 l. Software packages are not always sold by the manufacturer.
3 l. Usually, every high-level instruction translates into many more in machine code.
4 l. Systems programs are usually provided by the manufacturer.
5 l Programmers may be required to write software for their employers.

Task 6

Using the line reference given, look back in the text and find the reference for the words in *italics*.

1 if *they* are given the right (line 1)
2 *it* cannot be directly processed (line 5)
3 *it* is called an applications program (line 38)
4 commission *their* own programmers (line 40)
5 to write *them* to meet (line 40)
6 *that* would understand (line 48)
7 *which* controls the central (line 51)
8 links *them* to the object (line 54)
9 *They* are a set of programs (line 60)
10 *which* can be purchased (line 66)

Task 7

Using the line references given, refer back to the text and find words or phrases that have a similar meaning to:

1 converted (lines 5–10)
2 give the responsibility to (lines 35–40)
3 brings (lines 50–55)
4 are compatible with (lines 60–65)
5 matches (lines 65–67)

Task 8

Choose the correct word to complete each sentence. You may have to change some words slightly.

1 *instruction, instruct, instructed, instructor*

a Our maths ______________ explained to us the principles of binary arithmetic.

b We were ______________ to document our programs very carefully.

c Both ______________ and data have to be changed to machine code before the computer can operate on them.

2 *compilation, compiler, compile, compiled*

a Our university computer does not have a PASCAL ______________.

b Usually, a programmer ______________ his program before he puts in the data.

c A source program cannot be directly processed by the computer until it has been ______________

3 *result, results, resulting*

a The linkage editor links systems routines to the object module. The ______________ program, referred to as the load module, is directly executable by the computer.

b The ______________ of these mathematical operations were obtained from the university mainframe and not from my micro.

4 *specification, specify, specific, specified, specifically*

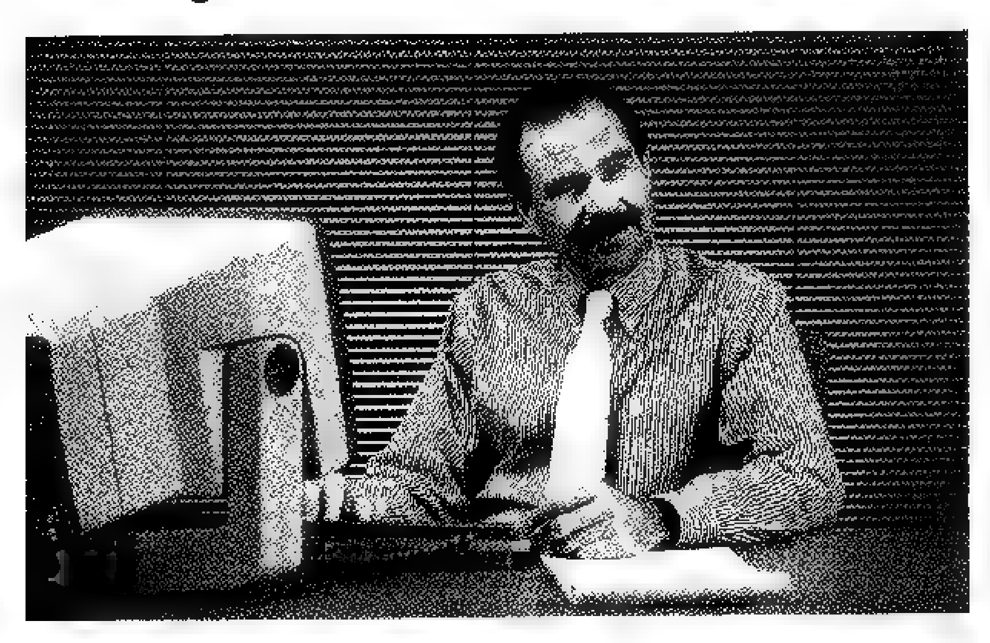
a Our company bought three packages with very ________ applications payroll, accounts receivable, and accounts payable

b An applications program is designed to do a ________ type of work, such as calculating the stress factor of a roof.

c Did the analyst give the new programmer the ________ necessary to start on the project?

C language

Listening



Task 9

Listen to this interview with David Wendt an expert on C. Are the following sentences true (T) or false (F)?

1 ☐ C was written to support the development of the MS/DOS operating system.

2 ☐ C was based directly on a language called BCPL.

3 ☐ UNIX was rewritten in C in 1973

4 ☐ C is rarely used for systems programming now.

5 ☐ C's main disadvantage is that it has a small set of operators.

6 ☐ C is more powerful than Assembler.

7 ☐ C can be used to access memory addresses directly.

8 ☐ Pascal and C produce equally fast and efficient code

9 ☐ C is the ideal language for everyone.

10 ☐ A language called D is expected to replace C

Listen again. Change the sentences that are false to make them true.

Task 10 Listen again to the cassette and fill in the gaps in the tapescript below.

INTERVIEWER: Could you give some examples of how it does that?

DAVID WENDT: Yes. With C, the programmer can access the underlying hardware. He can access memory addresses directly he can perform operations on values stored as ________, and he can store variables in registers just as in Assembler. This produces faster and more [2] ________ code than is produced by high-level languages like PASCAL. At the same time it provides the fundamental [3] ________ [4] ________ constructs required for well-structured programs: decision-making, loops, and [5] ________.
These features combined together provide a very powerful tool for the programmer.

INTERVIEWER: You make it sound like the ideal language for everyone.

DAVID WENDT: Well, no. I'm not saying that But if you need to write programs that are [6] ________, fast in execution, and yet ________ from one computer to another, then C is the language you should be using.

Reading

Task 11 Read the program below and the text on the next page, then complete the sentences which follow

```
/* CALCULATE AVERAGES */
main()
{
  float a,b,c,d,average;

  printf("Enter three numbers:");
  scanf("%f %f %f",&a,&b,&c);
  d=a+b+c;
  average=d/3.0;
  printf("The average is %f",average);
}
```

Comment Lines

A C source program consists of statements and *comment lines*. Comment lines are enclosed by the characters /* (at the start of the comment) and */ (at the end of the comment).

The Function main()

Every C program must have a function called **main** which must appear only once in a program. The parentheses following the word **main** must be present, but there must be no parameters included. The main part of the program is enclosed within braces {}, and consists of declaration statements, assignment statements, and other C functions. In the above program there are six statements within the braces: a declaration statement (the first statement of the main program starting with the word **float**), two assignment statements (the fourth and fifth statements starting with the variable names **d** and **average**), and three function statements, two to print information on the screen and one to scan the keyboard for input.

As C is a free form language, the semicolon (;) at the end of each line is a must. It acts as a statement terminator, telling the compiler where an instruction ends. Free form means that statements can be identified and blank lines inserted in the source file to improve readability, and statements can span several lines. However, each statement must be terminated with a semicolon. If you forget to include the semicolon, the compiler will produce an error, indicating the *next* line as the source of the error. This can cause some confusion, as the statement objected to can be correct, yet as a syntax error is produced.

Variables and the Declaration Statement

A variable is a quantity that is referred to by name, such as **a**, **b**, **c**, **d**, and **average** in the above program. A variable can take on many values during program execution, but you must make sure that they are given an initial value, as C does not do so automatically. However, before variables can be used in a program, they must be declared in a *type* declaration statement.

1 The Function ______ must appear only once in a program.

2 /* CALCULATE AVERAGES */ is a ______ line.

3 The statement **float a,b,c,d,average;** is a ______ statement.

4 The program below contains ______ function statements.

5 The assignment statements are on lines ______ and ______.

6 The main part of the program is enclosed within ______.

7 Each line of any C program must end with a ______, which acts as a statement ______.

8 If you forget to include the correct punctuation, the ______ will produce a ______ error.

9 A quantity referred to by name is known as a ______.

10 A ______ statement must be used to declare variables.

Task 12

Find words in the text which mean:

1. brackets (lines 5–10)
2. not fixed (lines 10–15)
3. systematically check (lines 10–15)
4. recognized (lines 15–20)
5. completed (lines 20–25)
6. starting (lines 25–29)

Task 13

The table below shows C's relational operators. Fill the gaps in the table.

C symbol	Meaning
==	equal to
<	1 ______
2 ______	equal to or less than
>	3 ______
>=	4 ______
!=	5 ______

Writing

Task 14

Using the completed table above, write sentences to illustrate the following:

1. a != b ______
2. a > b ______
3. a <= b ______
4. a >= b ______
5. a < b ______
6. a == b ______

Speaking

Task 15

Read the statements below. Which do you agree with more? Why?

'Learning a programming language is like learning any natural language. The only difference is that you are communicating with a machine instead of another person.'

'I get annoyed when I hear people comparing programming languages with natural languages. They have almost nothing in common.'

Word-play

Task 16

Solve the anagrams in the right-hand column and match them with the words in the left hand column to complete the phrases. The first one has been done for you.

1	high level	a	mestnttae	________
2	machine	b	thirmacite	
3	systems	c	peat	
4	object	d	taporeor	
5	linkage	e	omelud	________
6	magnetic	f	egguanal	*language*
7	binary	g	trodite	____
8	declaration	h	deco	________
9	comment	i	enil	
10	relational	j	nituroe	

Language focus D

Organizing information

A paragraph is a group of related sentences that develop an idea. In nearly every paragraph, there is one idea that is more important than all the others. The main idea of the paragraph is usually found at the beginning.

Sample paragraph 1

> All computers, whether large or small, have the same basic capabilities. They have circuits for performing arithmetic operations. They all have a way of communicating with the person(s) using them. They also have circuits for making decisions.

In sample paragraph 1, the first sentence, *All computers, whether large or small, have the same basic capabilities*, expresses the main idea of the paragraph.

All main idea sentences have a topic and say something about the topic.

Example

> *All computers* [topic], *whether large or small, have the same basic capabilities* [about the topic]

In some of your reading, finding main ideas may serve your needs but, in much of your studying, you need to understand details. It is sometimes more difficult to understand details than main ideas. You will find it helpful if you think of details as growing out of the main idea. In sample paragraph 1, there are three major details growing out of the main idea. These are the major details.

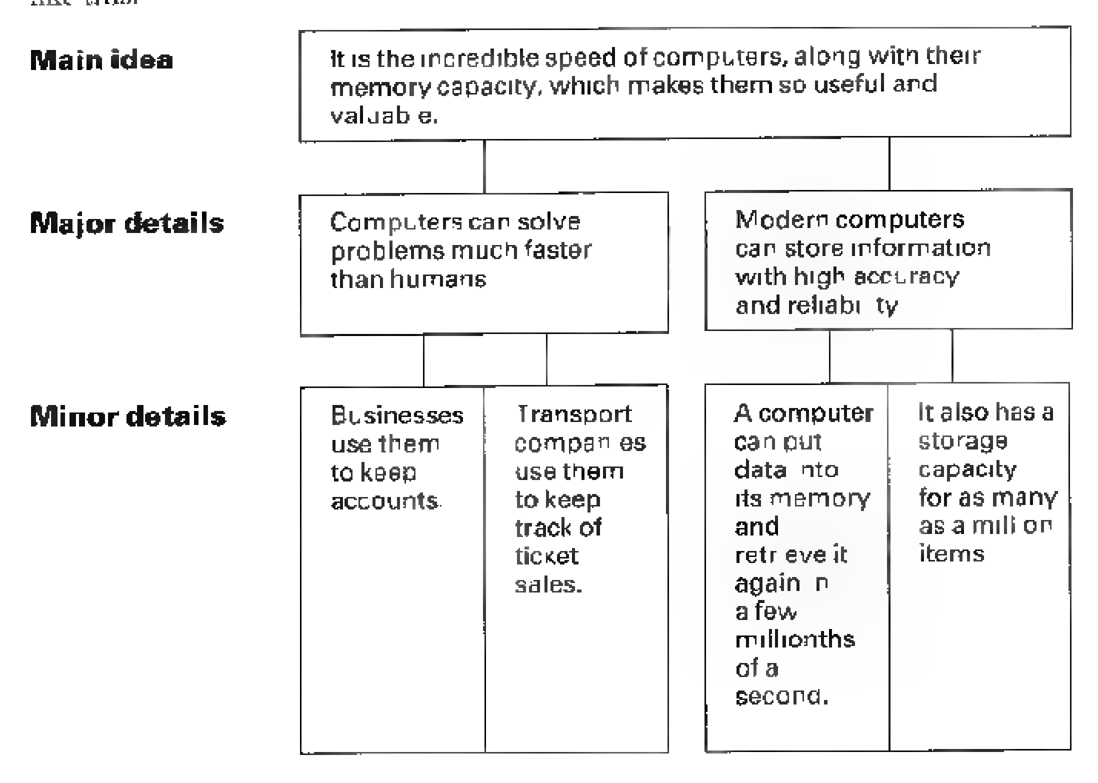
1. *They have circuits for* ***performing arithmetic operations***.
2. *They all have a way of* ***communicating with the person(s) using them***.
3. *They also have circuits for* ***making decisions***.

A major detail often has minor details growing out of it. These minor details tell more about a major detail, just as major details tell more about a main idea. In studying, you often find a paragraph that has many small details that you must understand and remember. Breaking up a paragraph of this kind into its three components: the main idea, major details, and minor details will help you to understand and remember what it is about.

Sample paragraph 2:

> It is the incredible speed of computers, along with their memory capacity, which makes them so useful and valuable. Computers can solve problems in a fraction of the time it takes man. For this reason, businesses use them to keep their accounts, and airline, railway, and bus companies use them to control ticket sales. As for memory, modern computers can store information with high accuracy and reliability. A computer can put data into its memory and retrieve it again in a few millionths of a second. It also has a storage capacity for as many as a million items.

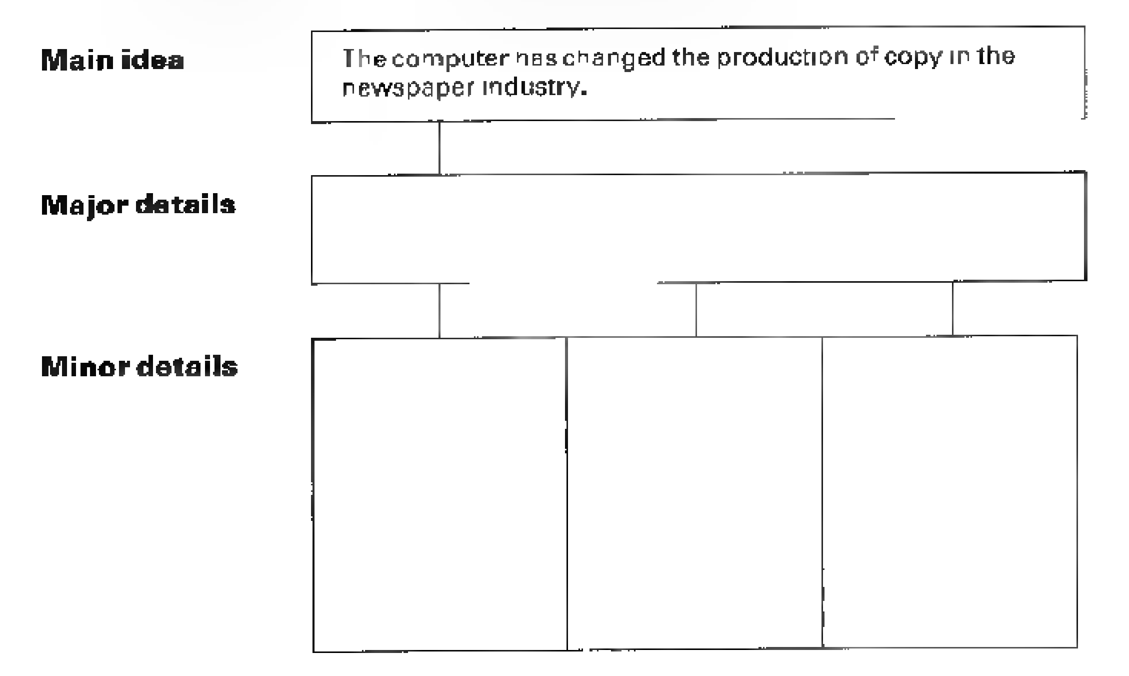
If you were to organize this paragraph into its three components, it would look like this:



In making a block diagram you don't have to write every word in the main idea sentence or in each of the detail sentences.

Exercise 1 Practise finding the main idea, major details, and minor details by completing the block diagram after reading the following paragraph.

The computer has changed the production of copy in the newspaper industry. There are three steps involved in the process, input, correction, and output. First, the computer numbers each story, counts words, and gives a listing of the length of each story. Then, a page is made up, advertisements are placed in the copy is shifted or deleted, and corrections are made. Finally, the computer hyphenates words, and the result of all this is a newspaper page



Exercise 2

Practise finding the main idea, major details, and minor details by completing the diagram after reading the following paragraph.

Railway companies use large computer systems to control ticket reservations and to give immediate information on the status of their trains. The computer system is connected by private telephone lines to terminals in major train stations, and ticket reservations for customers are made through these phone lines. The passenger's name, type of accommodation, and the train schedule is put into the computer's memory. On a typical day, a railway's computer system gets thousands of telephone calls about reservations, space on other railways, and requests for arrivals and departures. A big advantage of the railway computer ticket reservation system is its rapidity because a cancelled booking can be sold anywhere in the system just a few seconds later. Railway computer systems are not used for reservations alone. They are used for a variety of other jobs including train schedules, planning, freight and cargo loading, meal planning, personnel availability, accounting, and stock control.

Main idea

Major details

Terminals for ticket reservations

Minor details

Thousands of calls for reservations, space, arrivals, and departures



Computer software

Start-up

Task 1

Make a list of software products that you use (e.g. word processing, spreadsheets, etc.). Are there some features of the products you never use? Are there any features missing?

Reading

Task 2

In the magazine article which follows, a number of software developers express their opinions on the future of software technology. Read the article and tick (✓) the relevant boxes to show which opinions are expressed by the speakers.

Opinions	Mary Evans	Gerry Harper	Matt Andrews	Bob Bolton
In general, customers are getting what they want.	☐	☐	☐	☐
In general, customers are not getting what they want.	☐	☐	☐	☐
Software is too complex.	☐	☐	☐	☐
Software is not complex enough.	☐	☐	☐	☐
Software developers know what users want.	☐	☐	☐	☐
Software developers don't know what users want.	☐	☐	☐	☐

Catherine Bull investigates

This week: software

Software technology is getting more complicated. Developers have to cut through a jungle of computer languages, operating environments, and shifting standards to choose how they'll create their software. It's not an easy job. Software purchasers will have to live with the results for years to come. Which advances in software technology will prevail? Which ones will be just a flash in the pan? ►

I chose four well-known software developers and asked each to talk about current and future trends in software technology. Their comments reveal some common and diverse themes.

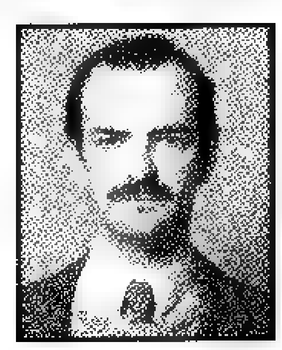
I began by asking them if they thought that software purchasers are getting what they need? What should developers be doing differently to give purchasers a better product?



Mary Evans 'In general, I think people are getting what they want – there are a lot of creative things being done with paint software, word processing, DTP (desktop publishing) systems, and the like. Do users want more? Of course! Users will always want more. The computer is an incredibly powerful tool, and any software that makes it easier, faster, more creative, or more cost effective will inevitably be in demand. But I'm generally optimistic about the way things are going at the moment. I think most of the major software manufacturers are able to read the market quite well.'



Gerry Harper 'I'm afraid I completely disagree with Mary. I just don't think that software purchasers are getting the technical support they need. While the products are getting more and more complex, and more and more expensive, it seems that support is starting to be thought of as an additional business opportunity. More generally, I've thought for some time that applications are getting too big, and that they're trying to do too much. Yes, they're versatile and powerful, but they're also often overwhelming. I think what we need are simple little programs that are easy to understand and use, and that work together to accomplish more complex tasks.'



Matt Andrews 'I really can't agree with that. To imagine we can just go back to "simple little programs" just ignores the complex needs of many of today's software users. No, I'm sure that you can't stop progress. Suppliers know what their customers want – they just can't supply it quickly enough. I've studied the market very closely, and I've found that purchasers' needs seem always to exceed the capability of the available software by a constant time-frame of about six to twelve months.'



Bob Bolton 'I think users are getting what they want, provided that their needs fit the off-the-shelf application. Specialized software is usually so specific that it should be written in house for businesses. Developers should add features that the customer needs, not what they think customers want. Some effort should be made to get feedback from the users before making an upgrade so that the proper features are added.'

► **Vocabulary**

a flash in the pan (l. 6) a success that lasts only a short time and is not repeated

off-the-shelf (l. 41) mass-produced, not made according to the individual needs of the customer

Task 3 Each of the following comments from the text is followed by two paraphrases Decide which paraphrase (**a** or **b**) is closer in meaning to the original comment Remember to look at the comments in their original context.

1 'Developers have to cut through a jungle of computer languages, operating environments, and shifting standards...' (line 1
   - **a** The huge number of languages, environments, and standards makes life difficult for software developers
   - **b** Software developers have to act to reduce the number of languages, environments, and standards which currently exist.

2 'Their comments reveal some common and diverse themes.' (line 8)
   - **a** They talk about ordinary and wide ranging topics.
   - **b** They agree about some issues, but disagree about others

3 'I think most of the major software manufacturers are able to read the market quite well...' (line 20)
   - **a** Most software manufacturers understand what consumers want
   - **b** Most software manufacturers know how to influence users to buy more of their products.

4 '...it seems that support is starting to be thought of as an additional business opportunity (line 25)
   - **a** Increased technical support is a means of making software more attractive to businesses.
   - **b** Software manufacturers are using the fact their products are complex to start selling technical support to their customers.

5 '... purchasers' needs seem always to exceed the capability of the available software by a constant time-frame of about six to twelve months.' (line 37)
   - **a** It takes about six to twelve months for purchasers to understand fully the software they buy.
   - **b** The software customers want now what will only become available in about six to twelve months.

Task 4 Which of the four speakers do you most agree with? Why?

Task 5 Using the line references given, look back in the text and find words or phrases in the text that have a similar meaning to.

1 penetrate (lines 1–5)
2 changing (lines 1–5)
3 win, survive (lines 5–10)
4 buyers (lines 10–15)
5 understand (lines 20–25)
6 flexible (lines 25–30)
7 too big, complex to manage (lines 25–30)
8 achieve (lines 30–35)
9 go beyond (lines 35–40)
10 information about a product, service (lines 40–45)

Writing

Task 6 Translate Mary Evans's comments (the paragraph beginning 'In general, I think people...') into your own language.

Listening

Task 7



Listen to the following radio talk show called *Computer Forecast*, in which Barry Harris, the host, is discussing the future of software technology with his two guests. Are the following sentences true (T) or false (F)?

1 ☐ Liz thinks that most PC users are too tolerant of design faults.

2 ☐ Liz thinks that only ten per cent of software users really know what they are doing.

3 ☐ Liz thinks that the increased sophistication of software will make the problem of lack of expertise among users even worse in the future.

4 ☐ Sam agrees that the vast majority of users of a single PC are inexperienced

5 ☐ Sam estimates that the number of experienced users and first-time buyers among his customers is about the same.

6 ☐ Liz thinks that multimedia isn't having a big impact on the software market because of its high price and the lack of appropriate technology

7 ☐ Sam disagrees with Liz about multimedia, and believes that it will replace conventional desktop publishing.

8 ☐ Both Liz and Sam agree that, in future, new software products will all have to be network-compatible.

Listen again. Change the sentences that are false to make them true.

Task 8

Read this extract from the tapescript of the conversation and fill in the gaps. To help you, the first letter of each missing word is given, and each gap is followed by a synonym for the missing word.

LIZ: No, I don't think that most PC users are s ________ [1] (experienced) – far from it. Compared with users on other systems, they are far more tolerant of f ________ [2] (defective) design.

HOST: That's a very strong c ________ [3] (assertion), Liz. Aren't you exaggerating the problem?

LIZ: No, I don't think I am exaggerating. I h ________ [4] (truly) think the v ________ [5] (great) majority of software users I've interviewed are not at all sophisticated. In fact, they're b ________ [6] (scarcely) able to cope with the programs they are using. I e ________ [7] (guess) they probably use only 10% of the features in any given application. Now we all agree that new software will d ________ [8] (certainly) be bigger and much more complicated, so the problem can only g ________ [9] w ________ [10] (deteriorate).

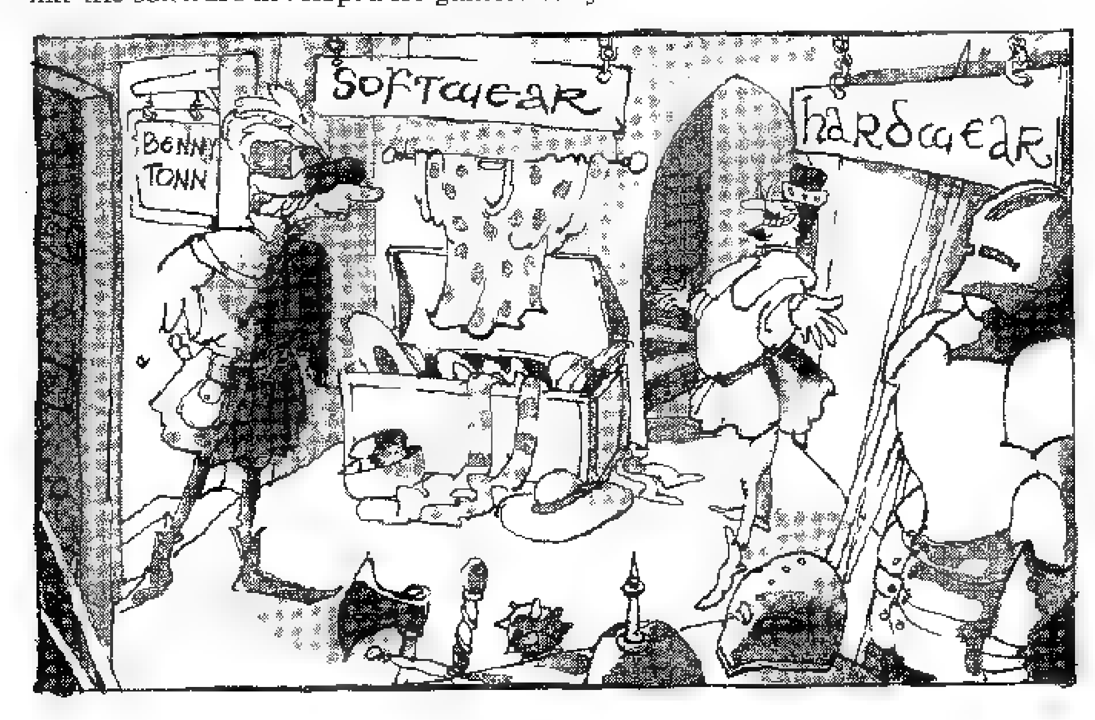
Now listen to the recording again and check your answers.

Speaking

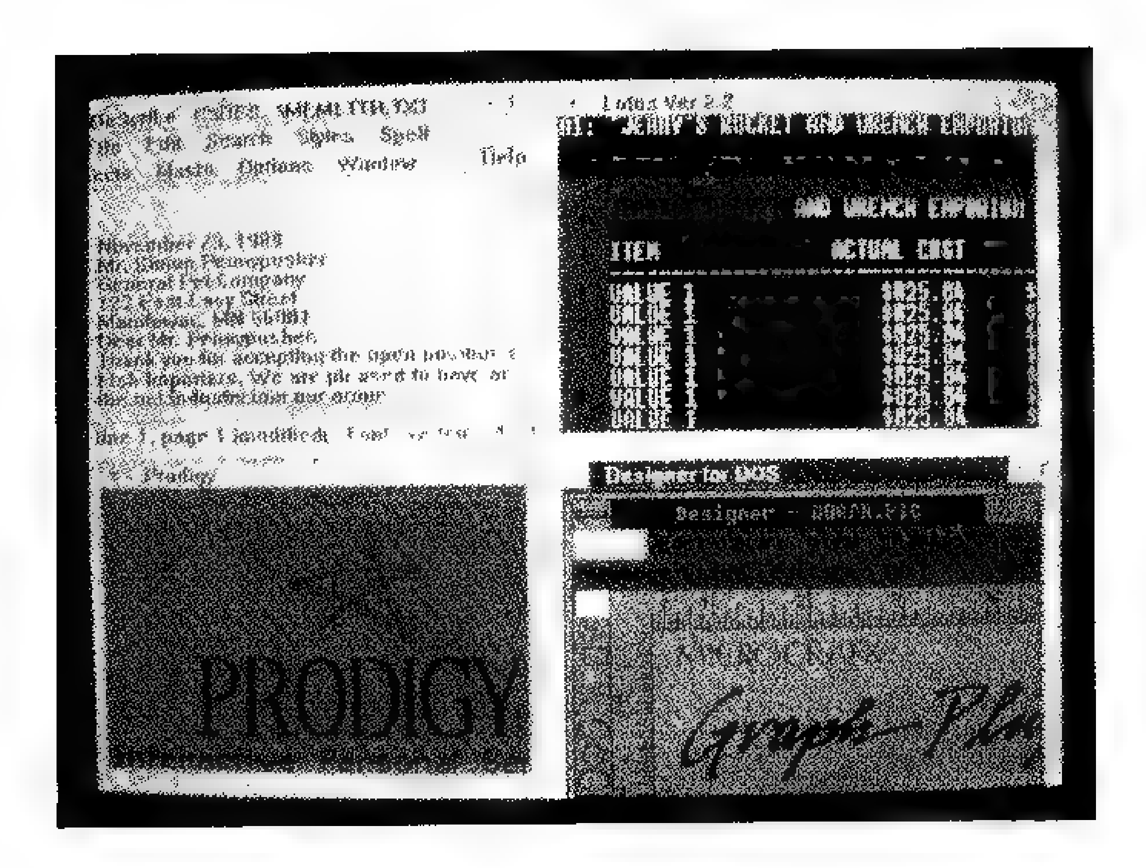
Task 9

Discuss the following questions.

1. If you were a developer of software, what kind of software package would you develop? Why?
2. Do you think software developers should develop educational software more like the software developed for games? Why?



Comparing software packages

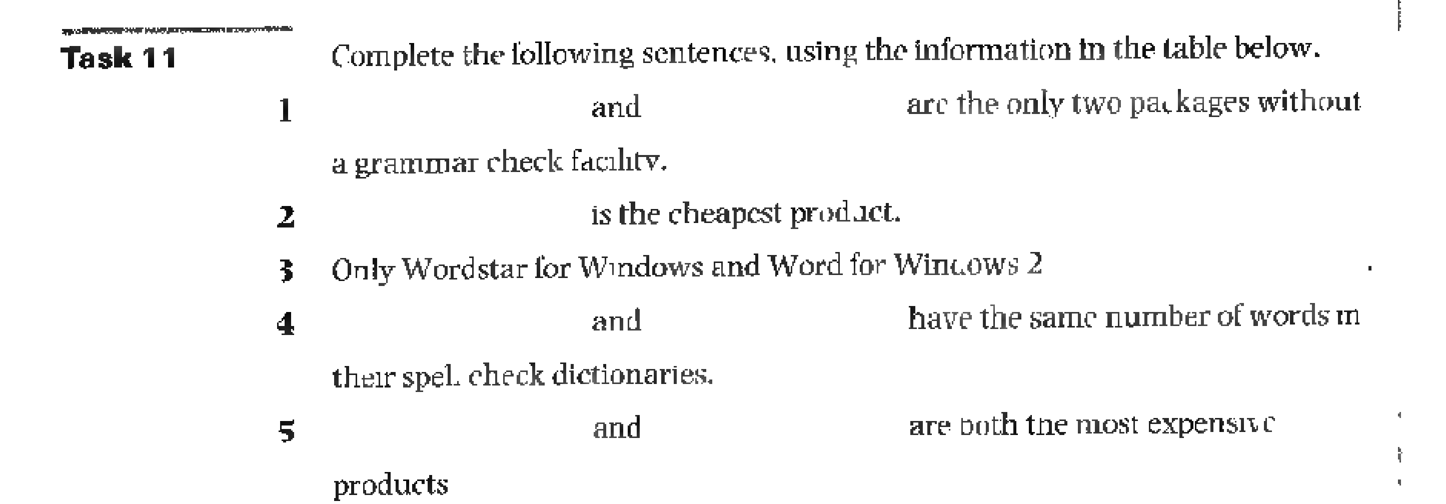


Reading

Task 10

The features below are common in commercially available word-processing and desktop publishing packages. Match each feature with the correct definition. The first one has been done for you.

	Feature		Definition
1	auto-kerning	a	can automatically generate a table of contents for a document
2	mail merge	b	can carry out simple calculations within a documen such as totalling columns, etc.
3	style sheets	c	a single text file can contain several 'rulers' with different margins and tab settings
4	input tagging	d	automatic numbering of figures, paragraphs etc
5	maths functions	e	can adjust the space between successive characters to produce a 'best fit'
6	table of contents	f	program can read in names and addresses from a database and create personalized letters for mail-shots
7	auto numbering	g	can automatically generate a sorted alphabetical index for a document
8	outliner	h	text from word processors and databases can be preceded with tags to allow the correct format to be applied automatically
9	index generation	i	these help to ensure uniform style throughout a document
10	multiple rulers	j	a writing aid enabling the structure of the document to be worked out beforehand and used as a guide when doing the detailed writing



Task 11 Complete the following sentences, using the information in the table below.

1 ____________ and ____________ are the only two packages without a grammar check facility.

2 ____________ is the cheapest product.

3 Only Wordstar for Windows and Word for Windows 2 ____________.

4 ____________ and ____________ have the same number of words in their spell check dictionaries.

5 ____________ and ____________ are both the most expensive products.

Word processors

Product	Price	Spell check dictionary size	Thesaurus	Grammar check	Mail merge	Outliner	Multiple rulers	Style sheets	Auto numbering	Multiple columns	Word count	Comments	Supplier and tel. no.
Ami Pro 2.0	£445	135,000	•		•	•	•	•	•	•	•	Drawing, charting, image processing	Lotus 0784 455445
JustWrite	£199	100,000	•		•	•	•	•	•	•	•	Table editor DDF support	Symantec 0628 776343
Professional Write Plus	£249	130,000	•	•	•		•	•	•	•	•	Harvard graphics import	Software Publishing 0344 867100
Upword	£395	OCED	•	•	•		•	•	•	•	•	DDF links with DOS and Windows	Wang 081 568 9200
Word for Windows 2	£445	130,000	•	•	•	•	•	•	•	•	•	Many DTP capabilities, plus drawing and charting tools	Microsoft 0734 270000
Wordperfect for Windows	£399		•	•	•	•		•	•	•	•	Powerful macro command language	Wordperfect Corp 0932 850500
Wordstar for Windows	£399		•	•	•	•	•	•	•	•	•	Keystroke compatible with Wordstar 6	Wordstar International 081 643 8866

Task 12 The table on the following page contains information about five DTP products (a–e). Using the hints below, identify the products.

1 PageMaker 4.0 and Ventura Publisher Windows 4.0 are both the same price.
2 PageMaker 3.01 has the fewest features.
3 Ventura Publisher Windows 4.0 has a spell check and an auto numbering facility.
4 Legacy is cheaper than Ami Pro for Windows 2.0.

a

b

c

d

e

DTP

Product	Price	Features: Input tagging	Search and replace	Spell check	Auto numbering	Table of contents	Index generation	Auto kerning	Text at any angle	Curved text	Comments	Supplier and tel. no.
a	£445	●	●	●	●	●	●	●			Graphics based WP system with DTP features	Lotus 0784 455445
b	£420	●	●	●		●	●	●			DDE compatible, import/export of text and graphics	NBI Ltd 0753 74118
c	£615	●						●			Includes Windows	Aldus (UK) Ltd 031 220 4747
d	£695	●	●	●	●	●	●	●	●		Adobe Type Manager included	Aldus (UK) Ltd 031 220 4747
e	£695	●	●	●	●	●	●	●			Full 24-bit colour support	Ventura Software 0753 550022

Writing

Task 13

Imagine that you are the product reviewer for a PC magazine. Decide which word-processing product in Table 1 is the best, then write a paragraph explaining your choice.

Speaking

Task 14

Work individually, then in pairs, using the information in the table on word processors in Task 11.

1. Individually, list the word-processing packages in order of merit (1 = best; 7 = worst).
2. In pairs, compare your lists. Explain the reasons for the order you chose. Try to persuade your partner to change his/her list to match yours.
   You may use the space below to write your lists.

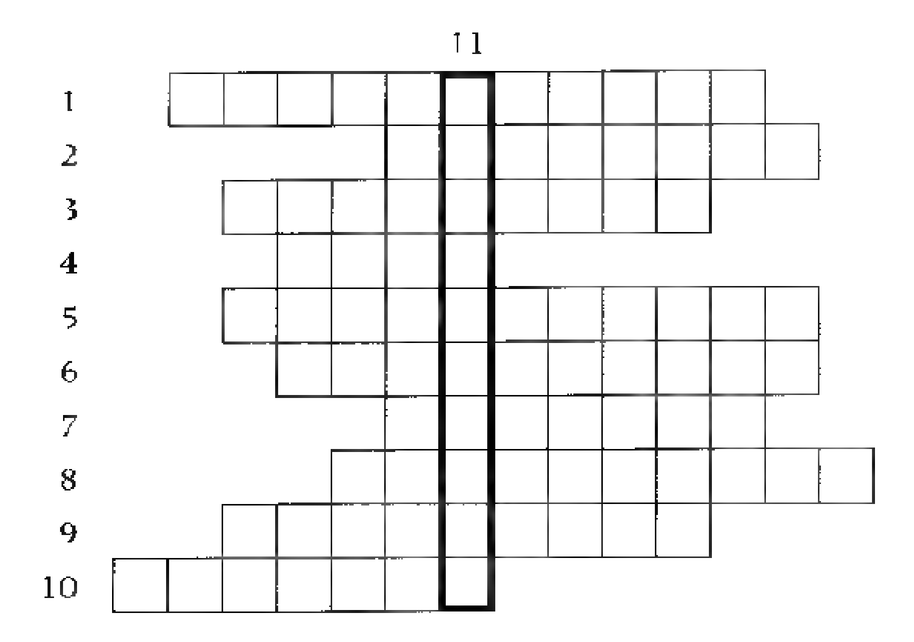
▶ Useful expressions

I agree with you about...
I'm afraid I can't agree with you about...
I think...
I don't think...
X is too expensive.
Y has more/fewer features.

Word-play

Task 15

Complete the puzzle and find the key word in 11 down



Across

1 A program designed to perform a specific function. (11)
2 A general term for programs which do not form part of a computer but are used when operating it (8)
3 A facility which allows the user to read in a file of names and create 'personalized' letters (4,5)
4 A sequence of instructions that is repeated until a desired condition is reached. (4)
5 A program that manipulates rows and columns of figures, used especially for accounting. (11)
6 The combined use on computer of text, graphics, video, animation, and sound (10)
7 The ___ editor is a systems program that fetches required systems routines and links them to the object module. (7)
8 The business of preparing, printing, and distributing books or magazines, etc. to the public. (10)
9 Someone who creates new software products. (9)
10 A program or series of programs directed at some generic application (e.g. word processing) that can be tailored by the user to match his individual needs. (7)

Down

11 An IBM- ___ computer is one which can be used with other IBM hardware. (10)

Language focus E

Making comparisons

Formation

The regular comparative and superlative forms of descriptive words (adjectives and adverbs) are shown below:

1 **Words of one syllable add the ending *-er* and *-est*.**

Examples:

	Absolute	Comparative	Superlative
Adjectives	new	newer	newest
	old	older	oldest
	big	bigger	biggest
Adverbs	soon	sooner	soonest
	late	later	latest

2 **Words with three or more syllables are preceded by *more* and *most*.**

Examples:

	Absolute	Comparative	Superlative
Adjectives	interesting	more interesting	most interesting
	convenient	more convenient	most convenient
	beautiful	more beautiful	most beautiful
Adverbs	easily	more easily	most easily
	carefully	more carefully	most carefully

3 **Adjectives with two syllables may be like 1 or 2 above in that they will add the ending *-er* and *-est* if they end in *-y* or *-ly*, *-ow*, *-le* and *-er*.**

Examples:

	Absolute	Comparative	Superlative
-y	tiny	tinier	tiniest
	speedy	speedier	speediest
-ly	early	earlier	earliest
	friendly	friendlier	friendliest
-ow	shallow	shallower	shallowest
	narrow	narrower	narrowest
-er	clever	cleverer	cleverest

4 **Most of the remaining two-syllable adjectives take *more* and *most* in front of them.**

Examples:

Absolute	Comparative	Superlative
careful	more careful	most careful
careless	more careless	most careless
boring	more boring	most boring
awful	more awful	most awful
complex	more complex	most complex

5 **Some common two-syllable adjectives can have either type of formation.**

Examples:

Absolute	Comparative	Superlative
common	commoner/ more common	commonest/ most common
gentle	gentler/ more gentle	gentlest/ most gentle
quiet	quieter/ more quiet	quietest/ most quiet

6 **Two-syllable adverbs ending in *-ly* take *more* and *most*.**

Examples:

Absolute	Comparative	Superlative
quickly	more quickly	most quickly
slowly	more slowly	most slowly
badly	more badly	most badly

7 **A small number of adjectives and adverbs have an irregular comparative and superlative form.**

Examples:

	Absolute	Comparative	Superlative
Adjectives	bad	worse	worst
	far	further/farther	furthest/farthest
	good	better	best
	many	more	most
Adverbs	badly	worse	worst
	far	further/farther	furthest/farthest
	little	less	least
	much	more	most
	well	better	best

Use in sentences

Comparisons may show equivalence, non-equivalence, the highest degree of something, and parallel increase.

1 **Equivalence: the following words or constructions are used to show that things or people are similar in some way.**

as ... as	are similar	each
as many ... as	equal to	either
as much ... as	is like	all
the same ... as	similar/ly	both
similar to	equal ly	alike
the same	compared to/with	

Examples:

1. *Here, the term 'processor' is* ***equivalent to*** *the central processing unit.*
2. *Laptops are* ***as*** *powerful* ***as*** *microcomputers.*
3. *Some companies have* ***as many*** *computers* ***as*** *employees.*
4. *Some companies use* ***both*** *disks* ***and*** *conventional filing systems for storing data*
5. *A computer virus is* ***like*** *a virus in the human body. It can do a lot of damage*
6. *Many word-processing programs are* ***similar*** *in that they share certain common functions.*

2 **Non-equivalence: the following words and constructions are used to compare or contrast things or people that are separate from each other.**

not as ... as	greater than	unequal(ly)
... er than	not as many ... as	unlike
more ... than	not as much ... as	not the same as
fewer ... than	not equal to	not all
less ... than		

Examples:

1. *A mainframe* ***is larger*** *and* ***more*** *expensive* ***than*** *a microcomputer.*
2. *Learning to use a computer is* ***not as*** *difficult* ***as*** *learning to program.*
3. *A fax board costs* ***less than*** *a fax machine.*
4. ***Unlike*** *factory-sealed software, pirated versions may contain viruses.*
5. *Desktop publishing is* ***the same as*** *electronic publishing.*
6. *You can save money with a network because you will need* ***fewer*** *printers.*

3 **The highest degree. the following words and constructions are used to compare one member of a group with the whole group (superlative).**

the ...-est	the most ...	the least ...

Examples:

1. *This is* ***the most popular*** *package on the market today.*
2. *BASIC is probably* ***the least difficult*** *programming language to learn.*
3. ***The best*** *programs are those adapted specifically to your own needs.*

4 **Parallel increase: the following words and constructions are used to show parallel increase (two comparatives).**

the ... er, the more ...	the more . .. the ...-er	the -er, the less ..

Examples:

1. ***The more memory*** *your computer has,* ***the more data*** *it can store.*
2. ***The bigger*** *your computer system* ***the less time*** *you spend waiting.*
3. ***The more*** *training you give to your employees,* ***the better*** *they will perform.*

Exercise 1

The following sentences express computer capabilities and limitations Decide whether the sentences express equivalence, non-equivalence, or the superlative, then underline the words expressing the comparison The first one has been done for you.

1 *equivalence* Speeds for performing decision-making operations are <u>comparable to</u> those for arithmetic operations.

2 ______ Even the most sophisticated computer, no matter how good it is, must be told what to do

3 ______ A computer can perform similar operations thousands of times, without becoming bored, tired, or careless

4 ______ For example modern computers can solve certain classes of arithmetic problems millions of times faster than a skilled mathematician.

5 ______ One of the most important reasons why computers are used so widely today is that almost every big problem can be solved by solving a number of little problems.

6 ______ Finally, a computer, unlike a human being has no intuition.

Exercise 2

Read the following sentences taken from previous units. Decide whether the sentences express equivalence, non-equivalence or the superlative, then underline the words expressing the comparison.

1 ______ Digital Research have continued to develop their operating system, DR DOS, and it is considered by many people to be a better product than Microsoft's. (Unit 1)

2 ______ For the last generation, Silicon Valley and Tokyo have been working to design computers that are ever easier to use. (Unit 2)

3 ______ There is one thing however, that has prevented the machines from becoming their user-friendliest ... (Unit 2)

4 ______ Clipboard PCs which, as their name suggests, are not much bigger than an actual clipboard – replace the keyboard with a liquid crystal display (LCD screen and an electronic stylus. (Unit 2)

5 ______ When the computer finds the closest match, it encodes the character in memory and displays it on the screen as if it had been typed. (Unit 2)

6 ______ There are a handful of clipboard computers now on the market, including GRIDPad, which is sold in the US; Penvision, manufactured by NCR and sold around the world, and Sony's Palmtop and Canon s AI Note, both sold only in Japan. (Unit 2)

7 ______ I'm frequently asked which online service is 'best' but, the answer is, there is no best. (Unit 3)

8 They tend to judge all other online services based on this first service often preventing themselves from seeing the advantages of a specific service. (Unit 3)

9 Each offers one or more products or features that either do not exist elsewhere or are superior to the same features on other services. (Unit 3)

10 Judge it based on what it offers and how it meets your needs not in comparison to what you're used to using. (Unit 3

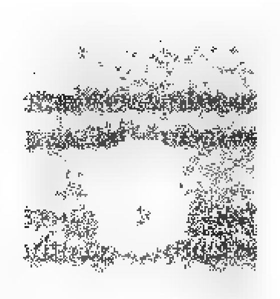
Exercise 3

Refer back to the table of word-processing packages (Unit 5, page 58) and write ten sentences comparing the products advertised

Examples:

Upword is more expensive than JustWrite

Ami Pro 2.0 has the largest spell check dictionary.



networks



There! That should make life easier!'

Start-up

Task 1

Try to answer these questions

1. What is a LAN?
2. What is a WAN?
3. What is a distributed system?

Reading

Task 2

Before reading the text opposite, match these words and phrases with their definitions.

1	protocol	**a**	analyse the syntax of a string of input symbols
2	bulletin board	**b**	a teleconferencing system allowing users to read messages left by other users
3	user interface	**c**	agreement governing the procedures used to exchange information between co-operating computers
4	make a query	**d**	means of communication between a human user and a computer system
5	parse	**e**	taking place at exactly the same time as something else
6	synchronous	**f**	request a search

Task 3 Read quickly through the text below, then match each paragraph with the appropriate summary.

- **a** ☐ Network uses, past and present
- **b** ☐ How distributed systems work
- **c** ☐ Networks and the future
- **d** ☐ What networks are and how they operate
- **e** ☐ The growth of networks past and present

Computer networks

1 Computer networks link computers by communication lines and software protocols, allowing data to be exchanged rapidly and reliably. Traditionally, networks have been split between wide area networks (WANs) and local area networks (LANs). A WAN is a network connected over long-distance telephone lines, and a LAN is a localized network usually in one building or a group of buildings close together. The distinction, however, is becoming blurred. It is now possible to connect up LANs remotely over telephone links so that they look as though they are a single LAN.

2 Originally, networks were used to provide terminal access to another computer and to transfer files between computers. Today, networks carry e-mail, provide access to public databases and bulletin boards, and are beginning to be used for distributed systems. Networks also allow users in one locality to share expensive resources, such as printers and disk systems.

3 Distributed computer systems are built using networked computers that co-operate to perform tasks. In this environment each part of the networked system does what it is best at. The high quality bit-mapped graphics screen of a personal computer or workstation provides a good user interface. The mainframe, on the other hand, can handle large numbers of queries and return the results to the users. In a distributed environment, a user might use his PC to make a query against a central database. The PC passes the query, written in a special language (e.g. Structured Query Language – SQL), to the mainframe, which then parses the query, returning to the user only the data requested. The user might then use his PC to draw graphs based on the data. By passing back to the user's PC only the specific information requested, network traffic is reduced. If the whole file were transmitted, the PC would then have to perform the query itself, reducing the efficiency of both network and PC.

4 In the 1980s, at least 100,000 LANs were set up in laboratories and offices around the world. During the early part of this decade, synchronous orbit satellites lowered the price of long-distance telephone calls, enabling computer data and television signals to be distributed more cheaply around the world. Since then, fibre-optic cable has been installed on a large scale, enabling vast amounts of data to be transmitted at a very high speed using light signals.

5 The impact of fibre optics will be considerably to reduce the price of network access. Global communication and computer networks will become more and more a part of professional and personal lives as the price of microcomputers and network access drops. At the same time, distributed computer networks should improve our work environments and technical abilities.

Task 4

Read this summary of the text and fill in the gaps using the list of words below

Computer networks link computers locally or by external communication lines and software [1] ____________, allowing data to be exchanged rapidly and reliably. The [2] ____________ between local area and wide area networks is, however, becoming unclear. Networks are being used to perform increasingly diverse tasks, such as carrying e-mail, providing access to public databases, and for [3] ____________. Networks also allow users in one locality to share resources.

Distributed systems use networked computers PCs or [4] ____________ provide the user [5] ____________. Mainframes process [6] ____________ and return the results to the users. A user at his PC might make a query against a central database. The PC passes the query, written in a special language, to the mainframe, which then [7] ____________ the query, returning to the user only the data requested. This allows both the network and the individual PC to operate efficiently.

In the 1980s, at least 100,000 [8] ____________ were set up world wide. As [9] ____________ orbit satellites have lowered the price of long-distance telephone calls, data can be transmitted more cheaply. In addition, [10] ____________ cable has been installed on a large scale, enabling vast amounts of data to be transmitted at a very high speed using light signals. This will considerably reduce the price of network access, making global networks more and more a part of our professional and personal lives. Networks should also improve our work [11] ____________ and technical abilities.

distinction	*fibre-optic*	*protocols*	*synchronous*
distributed systems	*LANs*	*queries*	*workstations*
environments	*parses*	*screen handling*	

Task 5

Using the line references given, look back in the text and find words that have a similar meaning to:

1. unclear (lines 15–20)
2. place (lines 25–30)
3. carry out (lines 35–40)
4. cost (lines 70–75)
5. world-wide (lines 80–85)

Task 6

Now look back in the text and find words that have an opposite meaning to:

1. disparate (lines 10–15)
2. conflict *v* (lines 30–35)
3. preventing (lines 70–75)
4. tiny (lines 75–80)
5. increase (lines 80–85)

Writing

Task 7

Translate the third paragraph, beginning 'Distributed computer systems ...' into your own language.

Listening

Task 8



Listen to this extract from the radio programme *Computerworks* about LANs. Indicate whether the following items are mentioned (✓) or not mentioned (✗).

1 ☐ LANs are equally useful to large and small companies

2 ☐ Companies can install their own LANs, provided they are not too big.

3 ☐ Whether or not a company builds a 'do-it-yourself' LAN depends on the amount of space available for the installation

4 ☐ It is sometimes still possible to install part of a LAN if you don't have the computer knowledge or time to do the whole job yourself.

5 ☐ You need at least three years' computer maintenance experience before you should attempt to install a LAN.

6 ☐ In order to install your own LAN, you need to be used to opening up computers, adding and removing expansion boards, and consulting computer documentation.

7 ☐ When installing your own LAN you should expect to have to repeat the same process several times.

8 ☐ The installation process often causes computers to break down

Task 9

Read this extract from the tapescript and try to fill in each gap with an appropriate word.

When you're installing a LAN, you may be [1] ________ your computers for as much as a day or so. A lot depends on how [2] ________ the installation proceeds, and *that* depends on your own [3] ________. Professional installers can have each of your machines [4] ________ of [5] ________ for only a few minutes at a time. If you can't live without your computers for a while, you might want to [6] ________ doing it yourself.

Installing a LAN involves running cable to several [7] ________. This may require you to install junction boxes in walls, do the wiring, and maybe install electrical [8] ________ as well. If you aren't [9] ________ with these skills and if you aren't a [10] ________ electrician, you will need to hire someone for this part at least. Of course, if you're installing your LAN in one room, then you might not need to hire [11] ________.

Now listen again to the last part of the recording. Check to see whether your answers match those used by the speaker.

Network configurations

Reading

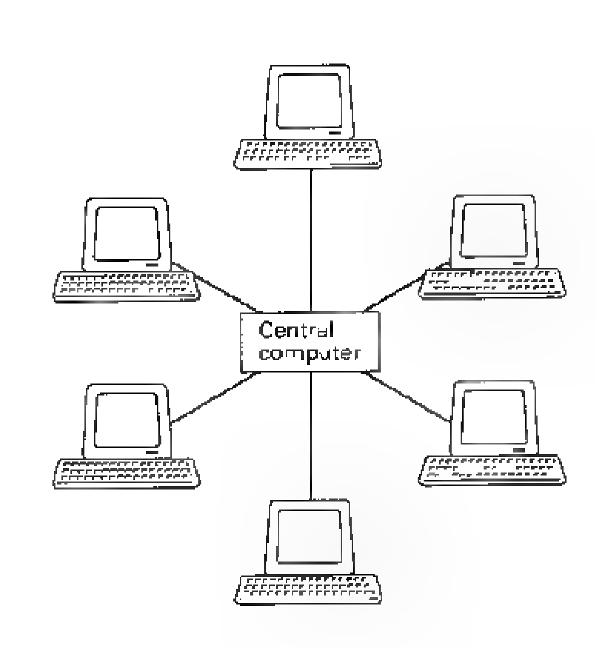
Task 10

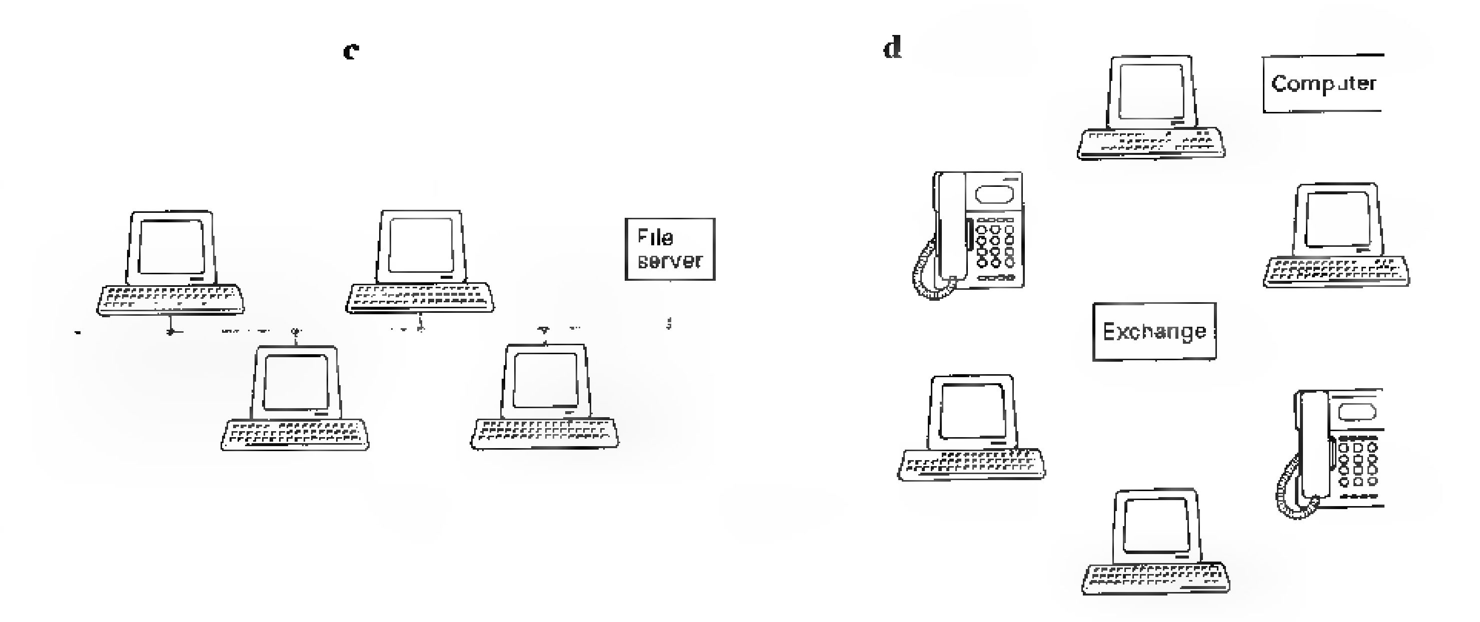
Read the following texts. Match each text with the correct illustration.

a

F e server

b





1 **Star**

In the star configuration, the central computer performs all processing and control functions. All access devices are linked directly to the central computer. The star configuration has two major limitations. First of all, the remote devices are unable to communicate directly. Instead, they must communicate via the central computer only. Secondly, the star network is very susceptible to failure, either in the central computer or the transmission links.

2 **Switched**

The central switch, which could be a telephone exchange, is used to connect different devices on the network directly. Once the link is established, the two devices communicate as though they were directly linked without interference from any other device. At the end of the session, the connection is closed, freeing capacity for other users and allowing access to other devices Multiple switches can be used to create alternative transmission routes.

3 **Ring**

Each device is attached to a network shaped as a continuous loop. Data proceeds in only one direction and at a constant speed round the loop. Devices may send information only when they are in control of the 'token'. The token is a package of data which indicates which device has control. The receiving device picks up the token, then clears it for another's use once it has received the message. Only one device may send data at any given moment, and each device must be working for the network to function

4 **Bus/Ethernet**

A bus network consists of one piece of cable terminated at each end to which all devices are connected In a bus-based network, each device is able to broadcast a message when it has detected silence for a fixed period of time All devices receive the broadcast and determine from the content of the message whether it was intended for them. The only problem occurs when two devices try to send at the same time. When a sending device detects another's transmission, it aborts its own.

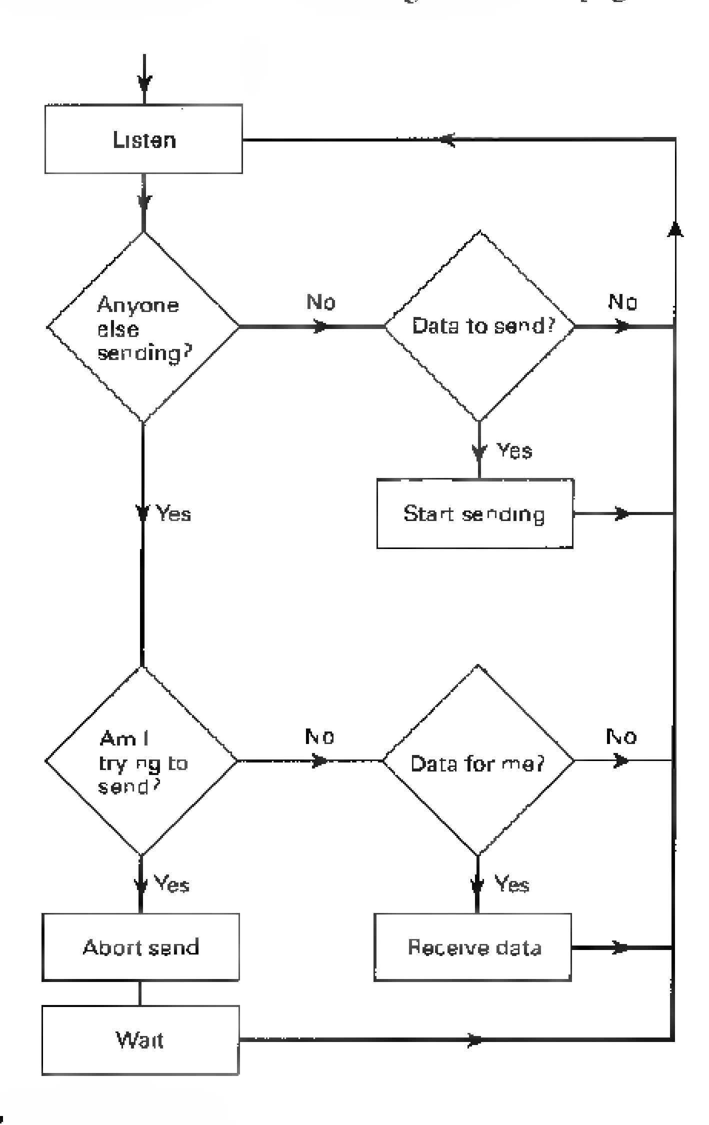
Task 11

These are answers to questions about the texts. Write the questions.

1 To connect different devices on the network directly
2 No, it goes in only one direction round the loop.
3 No, only one device may send data at any given moment.
4 From the content of the message
5 It cancels its own transmission.

Task 12

Which of the network configurations on page 71 does this flowchart refer to?



Task 13

The columns below describe characteristics of the *bus* and *ring* configurations. Which column refers to which configuration? How did you decide?

a	b
varied time response	calculable time response
easy expansion	difficult reconfiguration
fault-tolerant	fault-intolerant
simple	more complex

Speaking

Task 14

Work in pairs, A and B, using the information in the advertisement opposite. Prepare the role-play in advance and try not to refer to the advertisement during the activity.

Student A: You are a customer interested in the Netplan Eazy Kit. Before deciding whether to buy it, ask questions to find out:

1 what you need in order to use the Netplan Eazy Kit.
2 the total number of PCs you can run on it.
3 the cost of adding additional PCs.
4 how difficult it is to install.
5 what software it runs
6 the other features offered.

Student B: You represent the makers of the Netplan Eazy Kit. Make notes about the features of the product. Answer any questions and try to encourage the customer to buy it.

Netplan Eazy Kit

from as little as £215



This is not the only way to share software.

If your idea of sharing software is looking over a colleague's shoulder, then Netplan may have the ideal solution. To benefit from a network you only need two PCs.

The Netplan Eazy Kit costs just £215 and gives you all the hardware, software, and cabling you need to link two PCs. And for £100 per PC you can extend the network to up to six users. With Netplan Eazy even the smallest business can save time, money, and effort.

Extra efficiency
The Netplan Eazy Kit allows PCs to share the same data and software without having to copy and transfer disks. So whether you're dealing with customer enquiries or updating accounts, you can do it from the same machine. You can even send messages from one PC to another by e-mail.

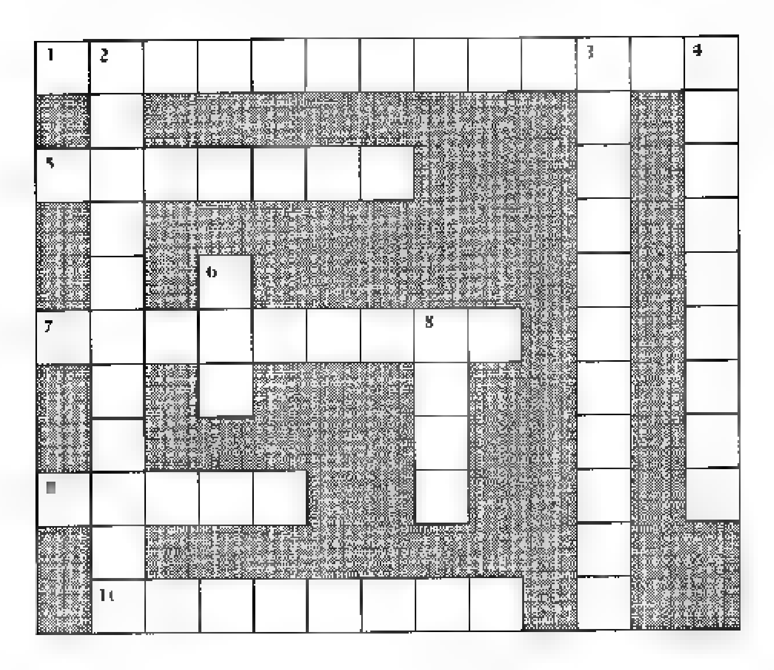
Netplan Eazy will also save you money on expensive resources like printers.

It's so Eazy
If you can use a screwdriver, you can install Netplan Eazy yourself. That's all it takes. And once installed, it runs on all popular software.

We also offer our customers unlimited access to our Freephone Helpline as part of the package. So why wait? Contact your nearest Netplan dealer today. Details are on the back cover of this magazine.

Word-play

Task 15 Solve the crossword puzzle using the clues below.



Across

1 The means of communication between a human and a computer. (4,9)
5 To load software on to a computer, ready for use. (7)
7 To transmit a message to all nodes on a network. (9)
9 and **3** down Usually found in one building or a group of buildings close together. (5,4,7)
10 This kind of network often uses a telephone exchange to connect different devices directly (8)

Down

2 Taking place at exactly the same time as something else. (11)
3 See **9** across.
4 An ____ board may be inserted into a computer to give it added features. (9)
6 The opposite of **9** across and **3** down. (3)
8 The network configuration in which all devices are linked through the central computer. (4)

Language focus F

Time sequence

In activities such as scheduling, doing routine activities, and conducting and describing experiments, it is important to recognize the sequence of events. As we know, events do not simply occur in isolation, they occur either before, during, or after other events. This time sequence may be chronological, logical, or causal. The following tables show examples of time relaters.

1 Before given time-references:

	Time relaters		
Adjectives	earlier former	preceding previous	
Adverbials	already prior before	earlier first formerly originally	previously so far yet
	before that before then	up to now/then until now/then	in the beginning (long) ago

Examples:

1 *The memory storage capacity of* ***earlier*** *computers was not as large as those of today.*
2 *When the first digital computer was developed, the first analog computer had* ***already*** *been in use for some time.*
3 ***Up to now*** *voice recognition technology has not been developed for mass marketing.*

2 Simultaneous with given time-references:

	Time relaters	
Adjectives	contemporary	simultaneous
Adverbials	at present at this point now/then today for the time being at the moment at that time	meantime meanwhile in the meantime when at the same time

Examples:

1. ***At that time*** *many new computer programs were being developed for use in businesses.*
2. *Computers may soon take over many daily tasks, but* ***in the meantime*** *ordinary people must continue to do them themselves.*
3. *Computer magazines keep us informed about* ***contemporary*** *issues in the computing world.*

3 After given time-references:

	Time relaters		
Adjectives	following	later	next
Adverbials	afterwards after that eventually	since by the time	by the end soon next

Examples:

1. ***Since*** *the development of the chip, computers have become cheaper and more compact.*
2. *You should have a good idea of the various applications of computer software* ***by the time*** *you finish reading this book.*
3. *Although initial versions of word-processing programs were not very complex,* ***later*** *versions were much more sophisticated.*

Sample paragraph:

Computers, as we know them *today*, have not been around for a long time. It was not *until* the mid-1940s that the first working digital computer was completed. But *since* then, computers have evolved tremendously. Vacuum tubes were used in the first generation computers only to be replaced by transistors in the second-generation computers *at the beginning* of the early 1960s. *By the end* of the 1960s, transistors themselves were replaced by tiny integrated circuit boards and, consequently, a new generation of computers was on the market. Fourth-generation computers are *now* produced with circuits that are much smaller than *before* and can fit on a single chip. *Even now*, new technologies are being developed to make even better machines.

Exercise 1

Read the following paragraph and, as you read, underline the time relaters.

During the seventeenth and eighteenth centuries, many easy ways of calculating were devised. Logarithm tables, calculus, and the basis for the modern slide rule were invented during this period. It was not until the early 1800s that the first calculating machine appeared and, not too long after, Charles Babbage designed a machine which became the basis for building today's computers. A hundred years later the first analog computer was built, but the first digital computer was not completed until 1944. Since then, computers have gone through four generations: digital computers using vacuum tubes in the 1950s, transistors in the early 1960s, integrated circuits in the mid-60s and a single chip in the 1970s. In the 1980s, we saw computers become smaller, faster, and cheaper. Earlier this decade, computers became portable, from laptops to palmtops. At the rate computer technology is growing now, we can expect further dramatic developments before the end of the century.

Exercise 2

Read the following sentences which come from previous units. Underline the time relaters and indicate whether they refer to before, during, or after the given time reference. The first one has been done for you.

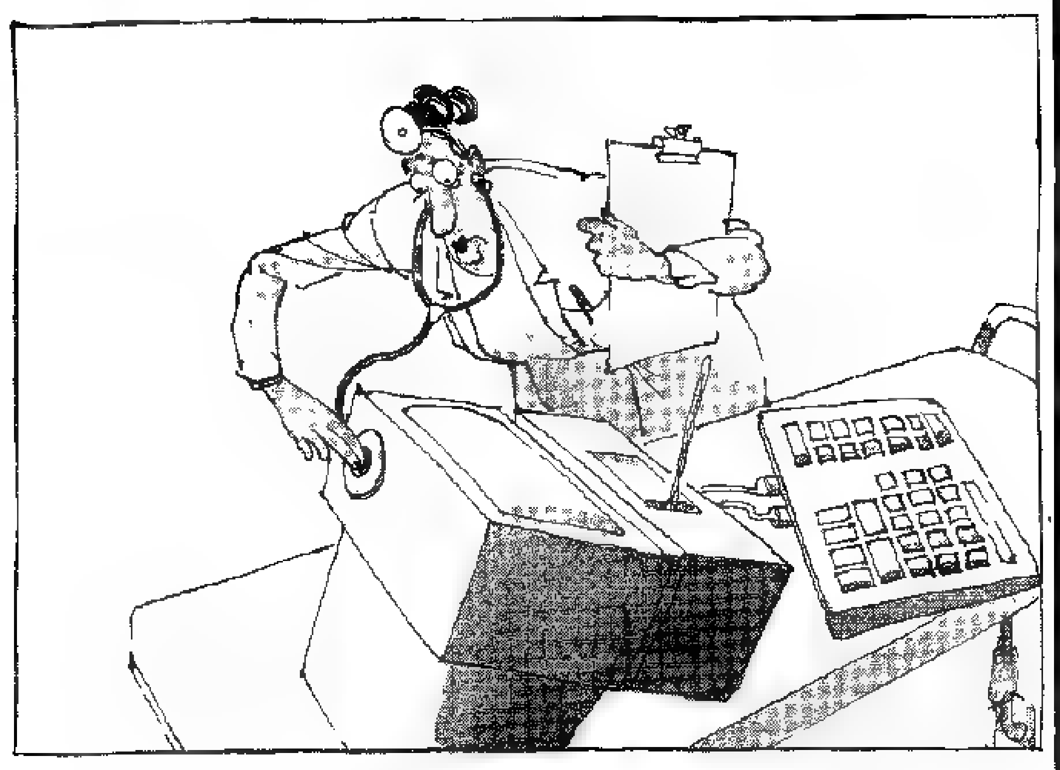
1. *after* Since then, over seventy million PCs made by IBM and other manufacturers have been sold. (Unit 1)
2. Over this period, PCs have become commodity items. Since IBM made the design non-proprietary, anyone can make them. (Unit 1)
3. Ten years later, in 1991, IBM were making PCs with 16Mb of memory, expandable to 64Mb, running with a processor speed of 33MHz. (Unit 1)
4. Large companies are considering running major applications on PCs, something which, ten years ago, no one would have believed possible of a PC. (Unit 1)
5. When the computer finds the closest match, it encodes the character in memory and displays it on the screen as if it has been typed. (Unit 2)
6. Enter the clipboard computer, a technology that has been in development for the last 20 years but took hold in the mass market only this year. (Unit 2)
7. Eventually, we're all going to be interlinked, no matter which service we use, in what DIALOG's Richard Ream calls a 'network of networks'. (Unit 3)
8. Until then, most of us have to go to more than one service to find everything we need. (Unit 3)

Exercise 3

Now refer back to paragraphs 1, 2, 4, and 5 of the text entitled *Computer networks* (page 67, Unit 6). Underline all the time relaters and indicate whether they refer to before, during, or after the given time reference.



Computer viruses



Start-up

Task 1

Try to answer these questions.

1 What is a computer virus?
2 How does a virus work?

Reading

Task 2

Before reading the text, match the words and definitions listed below.

1	a detonator	a	a protective device
2	an infector	b	to remove all traces of something
3	to boot	c	a device used to set off an explosion or other destructive process
4	to trigger	d	to discover or recognize that something is present
5	to erase	e	to set a process in motion
6	pirated	f	something which transmits a disease or virus
7	a shield	g	stolen, obtained without the owner's consent
8	to detect	h	to load the operating system into memory

Task 3 Now read the text to check your answers to Task 1.

How computer viruses work

A computer virus – an unwanted program that has entered your system without you knowing about it – has two parts, which I'll call the infector and the detonator. They have two very different jobs. One of the features of a computer virus that separates it from other kinds of computer program is that it replicates itself, so that it can spread (via floppies transported from computer to computer, or networks) to other computers.

After the infector has copied the virus elsewhere, the detonator performs the virus's main work. Generally that work is either damaging data on your disks, altering what you see on your computer display, or doing something else that interferes with the normal use of your computer.

Here's an example of a simple virus, the Lehigh virus. The infector portion of Lehigh replicates by attaching a copy of itself to COMMAND.COM (an important part of DOS), enlarging it by about 1000 bytes.

So let's say you put a floppy containing COMMAND.COM into an infected PC at your office – that is, a PC that is running the Lehigh program. The infector portion of Lehigh looks over DOS's shoulder, monitoring all floppy accesses. The first time you tell the infected PC to access your floppy drive, the Lehigh infector notices the copy of COMMAND.COM on the floppy and adds a copy of itself to that file.

Then you take the floppy home to your PC and boot from the floppy. (In this case, you've got to boot from the floppy in order for the virus to take effect, since you may have many copies of COMMAND.COM on your hard and floppy disks, but DOS only uses the COMMAND.COM on the boot drive.)

Now the virus has silently and instantly been installed in your PC's memory. Every time you access a hard disk subdirectory or a floppy disk containing COMMAND.COM, the virus sees that file and infects it, in the hope that this particular COMMAND.COM will be used on a boot disk on some computer someday.

Meanwhile, Lehigh keeps a count of infections. Once it has infected four copies of COMMAND.COM, the detonator is triggered. The detonator in Lehigh is a simple one. It erases a vital part of your hard disk, making the files on that part of the disk no longer accessible. You grumble and set about rebuilding your work, unaware that Lehigh is waiting to infect other unsuspecting computers if you boot from one of those four infected floppies.

Don't worry too much about viruses. You may never see one. There are just a few ways to become infected that you should be aware of. The sources seem to be service people, pirated games, putting floppies in publicly available PCs without write-protect tabs, commercial software (rarely), and software distributed over computer bulletin board systems (also quite rarely, despite media misinformation).

Many viruses have spread through pirated – illegally copied or broken – games. This is easy to avoid. Pay for your games, fair and square.

If you use a shared PC or a PC that has public access, such as one in a college PC lab or a library, be very careful about putting floppies into that PC's drives without a write-protect tab. Carry a virus-checking program and scan the PC before letting it write data onto floppies.

Despite the low incidence of actual viruses, it can't hurt to run a virus checking program now and then. There are actually two kinds of antivirus programs: virus shields, which detect viruses as they are infecting your PC, and virus scanners, which detect viruses once they've infected you.

Viruses are something to worry about, but not a lot. A little common sense and the occasional virus scan will keep you virus-free.

Remember these four points:

- Viruses can't infect a data or text file.
- Before running an antivirus program, be sure to cold boot from a write-protected floppy.
- Don't boot from floppies except reliable DOS disks or your original production disks.
- Stay away from pirated software.

Vocabulary

fair and square (l. 113) – honestly

it can't hurt (l. 126) – it's probably a good idea

Task 4

Decide whether the following statements are true (T) or false (F) in relation to the information in the text. If you feel a statement is false, change it to make it true.

1 ☐ Viruses cannot be spread through a computer network, only via floppies transported from computer to computer.
2 ☐ The virus will spread as soon as you put the infected floppy in your PC.
3 ☐ The infector works by interfering in some way with the normal use of your computer.
4 ☐ The detonator in Lehigh works by altering what you see on your screen.
5 ☐ Most viruses spread through pirated games.
6 ☐ You should run an antivirus program every time you use your computer.
7 ☐ There are not very many viruses in circulation.
8 ☐ Virus shields are more effective than virus scanners.

Task 5

Indicate the line reference where the following ideas are found in the text.

line

1 l. ___ The Lehigh virus must infect four copies of COMMAND.COM before damage is done to data.

2 l. ___ Always boot your computer from dependable DOS disks or your original disk.

3 l. ___ The infector part of a virus must first copy itself somewhere before the detonator part damages the data on your disks.

4 l. ___ Virus scanners discover viruses after the infection and virus shields discover viruses during the infection process.

Task 6

These are answers to questions about the text. Write the questions.

1 Two, one that infects and one that does the damage.
2 By interfering in some way with the normal use of the computer.
3 After it has infected four copies of COMMAND.COM.
4 Every time you access a hard disk subdirectory or a floppy disk containing COMMAND.COM.
5 Yes, by using your common sense and by occasionally scanning for them.

Task 7

Using the line reference given, look back in the text and find the reference for the words in *italics*.

1 *They* have two very (line 7)
2 is that *it* replicates *itself* (line 12)
3 enlarging *it* by about (line 36)
4 of *itself* to that file (line 53)
5 and infects *it* (line 73)
6 *This* is easy to (line 112)
7 *which* detect viruses (line 131)
8 once *they*'ve infected (line 134)

Task 8

Using the line references given, look back in the text and find words or phrases with a similar meaning to:

1 reproduces (lines 10–15)
2 infect (lines 12–17)
3 changing (lines 20–25)
4 immediately (lines 65–70)
5 complain (lines 85–90)

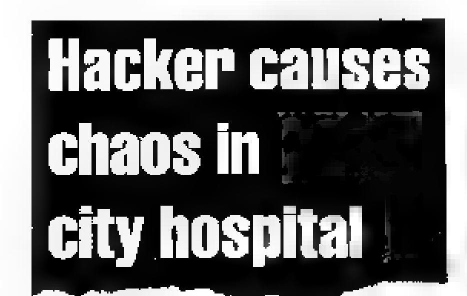
Using the line references given, look back in the text and find words or phrases that have an opposite meaning to:

6 reducing (lines 35–40)
7 removed from (lines 65–70)
8 records (lines 80–85)
9 ignorant (lines 95–100)
10 frequently (lines 100–105)

Computer security

Security breach blamed on 'hacker'

12 year-old hacks into bank's database



Computer fraud on the increase

Speaking

Task 9

In pairs, try to answer these questions:

1 Who or what is a 'hacker'?
2 How many ways can you think of to make the data in a computer secure?

Listening

Task 10

Listen to Steve, a computer technician, and Richard, the office manager at a language institute, talking about computer security.

As you listen to the conversation, answer the following questions.

1 What is the problem with the computer system at the language institute?
2 What would someone need to connect his/her PC to the office network?
3 What are the disadvantages of security passwords, according to Steve and Richard?
4 How does the 'smart' card work? Is it safe?
5 How much do you think Steve and Richard know about security systems?

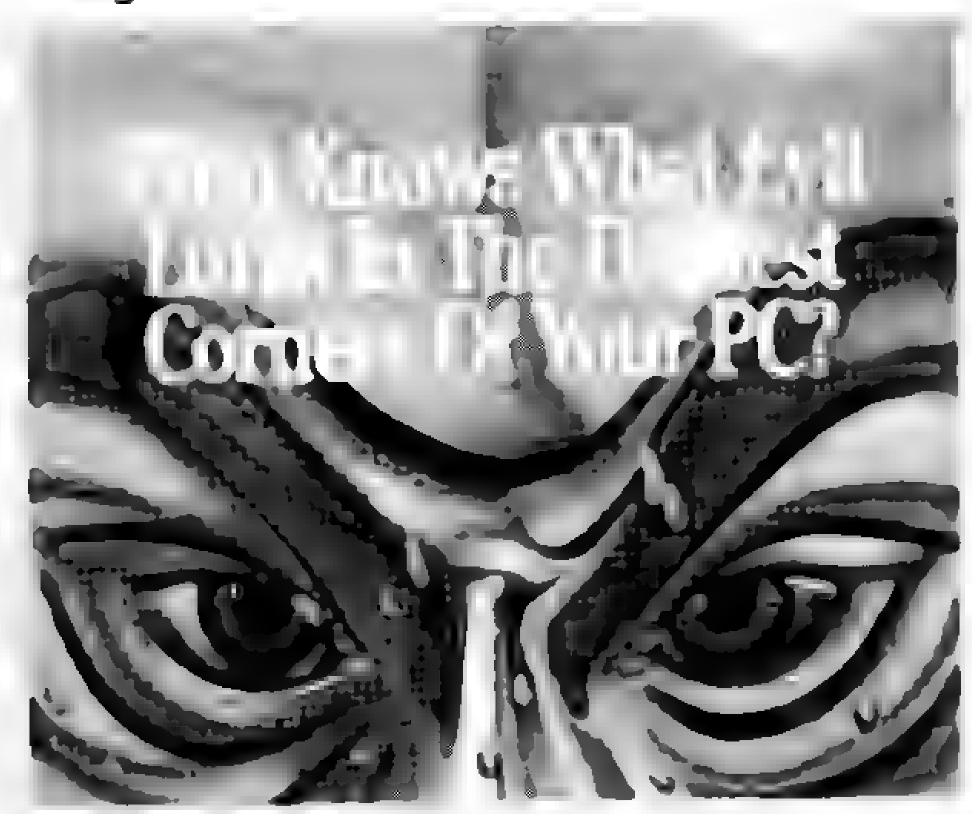
Speaking

Task 11

Steve and Richard must decide what to do. What advice would you give them? In groups or pairs note down the advantages and disadvantages of the possible solutions. Think about safety, cost, and ease of use. Try to decide on the best solution.

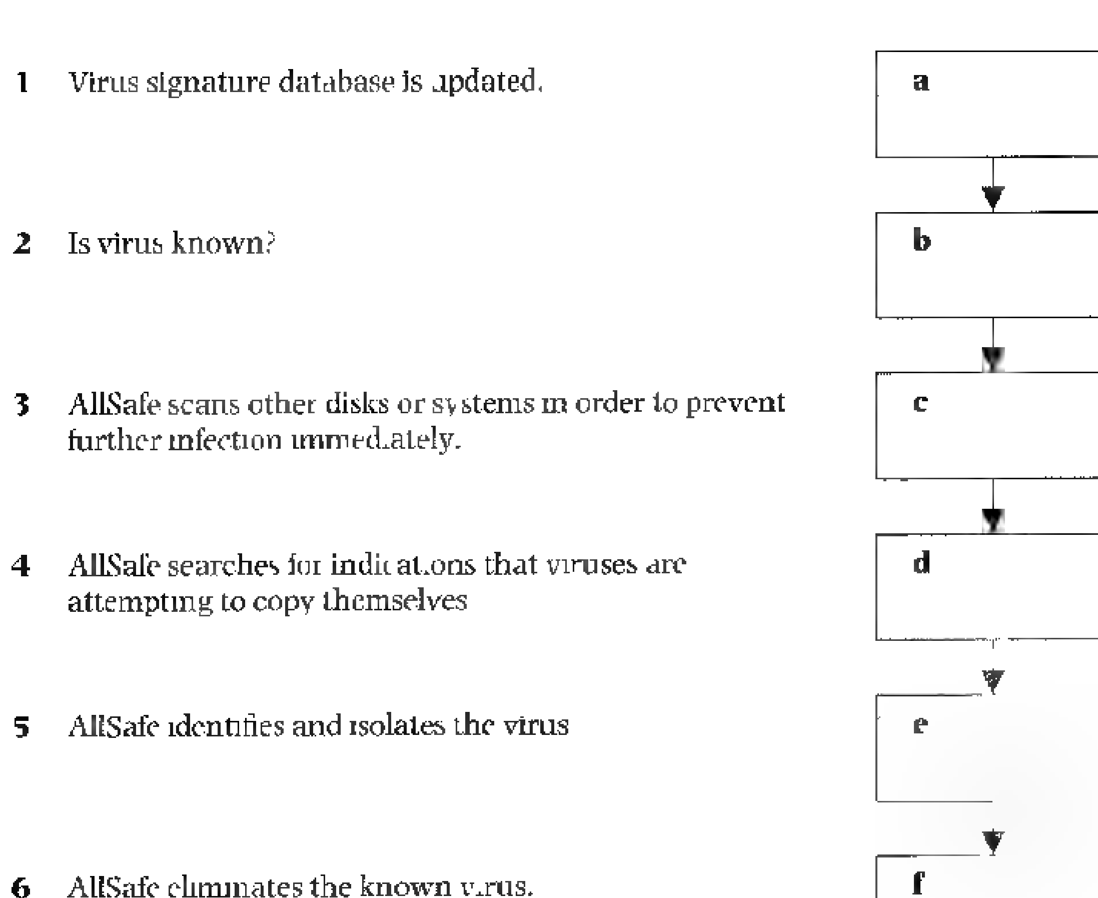
Reading

Task 12





The flowchart on the following page represents the steps in the process by which AllSafe removes viruses from PCs. Using the information in the advertisement, match each step with the corresponding letter in the flowchart.



1 Virus signature database is updated.

2 Is virus known?

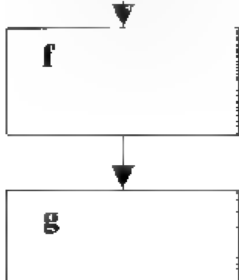
3 AllSafe scans other disks or systems in order to prevent further infection immediately.

4 AllSafe searches for indications that viruses are attempting to copy themselves

5 AllSafe identifies and isolates the virus

6 AllSafe eliminates the known virus.

7 AllSafe analyses the virus and learns its signature straight away.



Task 13

Find words or phrases in the text which mean:

1 wickedness, badness, danger
2 hides (while waiting to attack)
3 causing a lot of damage
4 people who interfere without authorization
5 terrify, make very afraid
6 combines
7 identified, recognized
8 frightening
9 choices
10 attackers

Speaking

Task 14

Discuss the following questions:

1 What technique does the advertisement use to persuade people to buy the product?
2 Do you think the advertisement is successful? Give reasons for your opinion.
3 What other techniques could be used to sell this kind of software?

Writing

Task 15

Design an advertisement for a PC protection package. Your advertisement should mention all the features listed below, but you may add others. Choose a name, and decide on the best way to present your product.

Features
Password protection – system manager controls what each user is permitted to do
File encryption – plain text messages are converted into cipher (code) so that only authorized recipients can read them
Keyboard lock – screen is cleared and keyboard is locked after pre-set period of inactivity

Reading

Task 16

Read this news report and discuss the questions that follow.

NSA consultant's son is computer saboteur

'Worm' came from graduate student

A court heard today how a Cornell University graduate student, Robert T. Morris Jr. (25), infected a host of government and educational computer centres with a computer virus, known as a 'worm', which literally brought all computational activity to a halt in over 6,000 installations. Morris, the son of a prominent National Security Agency computer consultant, was sentenced for his offences yesterday. As punishment, he was required to spend no time in prison but, instead, serve three years' probation, contribute 400 hours of community service, and to pay a $10,000 fine along with associated court and probation costs.



1. How serious do you think Robert Morris's crime was?
2. Do you think the punishment was
   - **a** too severe?
   - **b** about right?
   - **c** not severe enough?
3. Do you know of any similar incidents of computer hacking?

Word-play

Task 17

The words and phrases below are taken from this unit. In pairs or groups, decide if they have a 'protective' or a 'destructive' meaning as they are used in the unit, then put them under the correct heading.

detonator	infector	erase	pirated
infect	write-protect tab	worm	virus scanner
hacker	password	smart card	shield
signature	cipher	keyboard lock	access control

protective **destructive**



How many other ways can you think of to classify them?

Language focus G

Listing

It is important when reading to recognize and understand the relationship in which sentences and groups of sentences combine to present information. This information may be linked by means of a connective word or marker.

Making a list, for example when enumerating, and giving instructions, indicates a cataloguing of what is being said. It is important to note that most enumerations belong to clearly defined sets. The following table is a list of the markers that can be used to show the order in which things are to be said.

1, 2, 3, etc. one, two, three, etc. first(ly), second(ly), third place	
another, next, then furthermore, afterwards, moreover	
lastly, finally to begin, start with, and to conclude	
first and foremost first and most important(ly)	mark the beginning of a descending order
above all last but not least	mark the end of an ascending order

There are many ways of showing sequential relationships. Those given in the table above are not the only ones, they are the most common ones used in listing or enumerating. The *-ly* forms are usually used when listing.

Sample paragraphs:

More and more police departments are now using sophisticated devices to help control the increasing crime rate. Some of these devices are: *firstly*, a computer terminal inside a police vehicle to answer an officer's questions; *secondly*, a computer-controlled display unit for displaying fingerprints, and *thirdly*, educational systems for police officers such as terminals, enabling them to verify changes in laws, rules, and regulations.

The computer memory of many law enforcement systems contains all kinds of information. *First and foremost*, it has data on stolen items such as cars, licence plates, and property. *Second*, it has information on missing persons and wanted fugitives. *Last but not least*, it contains information on political extremist groups and their activities.

Computers have certainly revolutionized police work by providing access to millions of items of information with the least possible delay and speeding up the process of apprehending suspicious-looking characters.

Exercise 1

Complete the following paragraph about the various steps in the creation of a database by filling in the blanks with appropriate listing markers.

When you are creating a new database, you must [1] ________ decide how many fields you will need in your database. [2] ________, you will have to provide up to five items of information about each field. [3] ________, each field needs to have a name. [4] ________, the field type has to be defined. Character, numeric, date and logical are some common types. [5] ________ choice to be made is the width of the field. However, some fields, such as date, have present default values. The [6] ________ step is to set the number of decimal places if the field is numeric. [7] ________, you will have to indicate whether the field is to be indexed or not.

Exercise 2

Complete the following paragraph by filling in the blanks with appropriate listing markers.

Computers can do wonders, but they can waste a lot of money unless careful consideration goes into buying them. Businessmen and women thinking of buying a computer system should [1] ________ admit they know very little about computers. [2] ________, they must realize that the computer sales people don't always know how their business works.

[3] ________ it is essential that buyers should get outside advice, not necessarily from consultants but from other executives who have had recent experience in buying a computer system. [4] ________ they should try to see systems similar to ones under consideration in operation. Because their operations will have differences that must be accommodated, they should [5] ________ find out what would be involved in upgrading a system. [6] ________ important thing to know before buying a computer is the financial situation of the supplier because computer companies come and go and not all are financially stable. [7] ________, the prospective buyer should demand that every detail be covered in writing, including hardware and software if they are supplied by different companies. There's nothing wrong with computers themselves, it's how and why they are used that can cause problems.



Computers in the office

Start-up

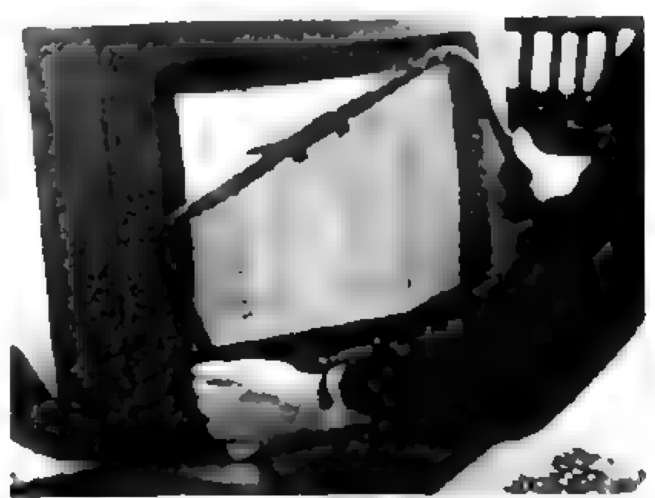
Task 1

What aspects of computer technology are illustrated below? Make a list of any other examples used in the office.

a



c



b



d



Reading

Task 2

Read the text opposite. How many of the items you listed in Task 1 are mentioned?

Visions of Tomorrow

First, safety. Radiation screens are available, and have been for some years. Most of them place an emissions barrier between you and the front of your display, while others encase the entire monitor, protecting you from side and rear emissions as well. Many offices already have these screens available for their workers.

The paperless office is still a dream, but the basic tools are in place. We receive mail in two basic forms: on paper in an envelope, or electronically on our computers. Most of us have access to e-mail in one form or another. That's half the battle won. The other half is a bit more difficult, but it can be, and is being, done. All mail can be opened in the mail room and scanned into the computer using optical character recognition (OCR). Then a document image-processing program takes over and lets you accomplish electronically what you would normally do with paper. Various personal computer products are available for this purpose.

Pen-based computing is coming into its own. Pen-input capabilities are beginning to show up in hardware, applications and operating systems. You can't take notes that will go directly into your computer, and the technology wouldn't know what to do with your doodles, but it would know that a doodle isn't a valid word. And that's a start – a good one.

Multimedia really needs no explanation. There are many packages that help you create multimedia presentations, and the tools to create customized multimedia training programs are also plentiful. CD-ROM disks, such as Ziff-Davis's Computer Select and Microsoft's Bookshelf, let you access mountains of information with ease.

Computers are already much smaller than they used to be, and you can't go to an industry show these days without finding some company promoting its 'small footprint'. When you start talking about laptops, notebooks, and palmtops, the question becomes, 'How small is too small?' FAX capabilities are already available on boards that you can plug into your computer. When you combine the technologies present in internal modems with voice recognition, the basics for having your computer replace your phone voice line are in place.

Voice recognition is another technology that may appear limited in its present form, but it shows great promise for the future. Current voice recognition systems can handle speaker-dependent continuous speech or speaker-independent discrete speech.

Speaking to your computer will be a major factor in the office of the future. In some locations, it is already a major factor in the office of today. Stock is traded in some brokerage houses by verbal command from the broker to the computer. So, you ask your computer a question, and it answers you verbally. Depending on the rate of speech sampling used and the resolution the A/D converter uses for each sample, we can already create a credible approximation of human speech with digitized sound.

Large display screens? You can get screens of up to 35 inches now, and between Barco and Mitsubishi competing for the honor of having the largest monitor, it's hard to predict just how big they will get in the future. As for color, some companies offer upwards of 16 million. Somewhere in that number must lie the perfect color for reducing eye-strain.

The real disaster that most of us still have to deal with is the traditional keyboard, which is the cause of much pain and suffering in the form of carpal tunnel syndrome and other repetitive-strain injuries. Wrist rests are available to alleviate the problem, and new designs for strange-looking keyboards, *Star Trek*-style, are moving from the drawing board to the factory.

Enterprise networks are proliferating almost as fast as LANs did just a year or two ago. Public data networks are ripe for the dialling up and signing on. And the Internet already exists, with several of the research and educational facilities on its membership rolls.

Worldwide connectivity is already available in the enterprise networks of some major corporations (e.g. DEC's DECnet and IBM's Systems Network Architecture). Admittedly, these are proprietary networks, but they are living proof that the concept can and does work.

Vocabulary

doodle (l. 49) – meaningless drawing
brokerage houses (l. 102) – companies that buy and sell shares for clients
carpal tunnel syndrome (l. 135) – chronic wrist strain caused by repetitive movement, such as typing
Star Trek (l. 141) – futuristic American television series of the 1970s, 1980s

Task 3

Using the table below, make a summary of the main points of the article in note form.

Item	Current/potential use

Task 4

Each of the following sentences from the text is followed by two paraphrases. Decide which paraphrase (**a** or **b**) is closer in meaning to the original comment. Remember to look at the comments in their original context.

1 Pen-based computing is coming into its own. (line 38)
  a Pen based computing is receiving the recognition it merits.
  b Pen-based computing is good for tasks where a conventional pen would normally be used.

2 ...you can't go to an industry show these days without finding some company promoting its 'small footprint'. (line 67)
  a At every exhibition these days, you will find at least one company advertising its own miniature computer.
  b It is impossible to get invited to a computer show these days unless you have a contact in a company manufacturing miniature computers.

3 Current voice-recognition systems can handle speaker dependent continuous speech or speaker independent discrete speech. (line 91)
 a Some of today's voice-recognition systems are set up to recognize continuous speech from certain people, while others can recognize specific words from anyone
 b All of today's voice-recognition systems are set up to recognize either continuous speech from certain people or specific words from anyone.

4 Public data networks are ripe for the dialling up and signing on. (line 147)
 a There are public data networks waiting to be used.
 b Public data networks are now sufficiently developed to be used.

Task 5

1 Do you think the English in the text is:
 a very formal?
 b quite formal?
 c neutral?
 d quite informal?
 e very informal?

2 Do you think this article originally appeared in:
 a a computer magazine?
 b a general magazine for young people?
 c a general magazine for adults?
 d an online bulletin board?
 e the science page of a newspaper?

3 Do you think this article is written by
 a a British person
 b an Australian
 c an American
 d a non-native speaker of English

Give reasons for your choices.

Task 6

Using the line reference given, look back in the text and find the reference for the words in *italics*.

1 while *others* encase (line 7)
2 *The other half* is a bit more difficult (line 23)
3 but *it* can be (line 24)
4 but *it* would know (line 48)
5 in *its* present form (line 88)
6 *it* is already a major factor (line 99)
7 *which* is the cause (line 133)
8 on *its* membership (line 153)

Task 7

Using the line references given, look back in the text and find words with a similar meaning to:

1 whole (lines 5–10)
2 usually (lines 30–35)
3 acceptable (lines 45–50)
4 seem (lines 85–90)
5 believable (lines 110–115)
6 decreasing (lines 125–130)
7 spreading (lines 140–145)
8 ready (lines 145–150)

Now find words or phrases that mean the opposite of:

9 danger (lines 1–5)
10 destroy (lines 55–60)
11 rare (lines 55–60)
12 separate (lines 75–80)
13 minor (lines 95–100)
14 less than (lines 120–125)
15 enjoyment (lines 130–135)
16 aggravate (lines 135–140)

Task 8

Choose the correct word to complete each sentence. You may have to change some words slightly.

1 *consider, considered, consideration, considerable, considerably*

a We'll have to ______ using another company if they can't provide the software we need.

b The company has invested a ______ sum of money in ergonomic workstations.

c The CEO has submitted this proposal for your ______

d This computer is ______ faster than the old one.

2 *apply, applying, applicant, application, applicable*

a We have interviewed five ______ for the new position.

b The last part of the form is not ______ to foreign students.

c My student is thinking of ______ for a government grant to continue his research.

d The new book uses business ______ to teach computer studies.

3 *explain, explained, explaining, explanation, explanatory*

a The package includes an ______ booklet.

b The instructions are very clear and do not require any further ______.

c It will only take a couple of minutes to ______ how the program works.

d If you are new to this system, almost everything will have to be ______.

4 *depend, depending, dependent, dependence, dependable, dependably*

a The company has supplied us ______ for over ten years.

b We have to reduce our ______ on imported goods.

c This is very ______ equipment. We have never had a serious breakdown.

d Today, many companies ______ more on FAXes than on mail.

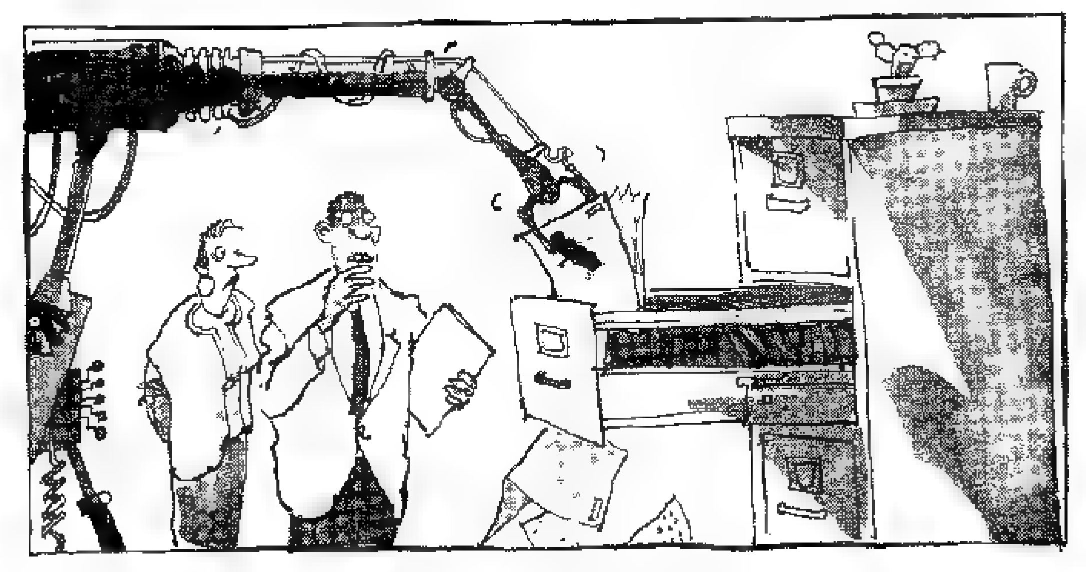
5 *connect connected, connecting, connector, connectivity, connection*

a ______________ is an important concept in global communications.

b He only got that contract because he has ______________ in the government.

c Make sure the ______________ is not loose before you call a service technician.

d Once the new telephone lines are ______________, our system should be more efficient.



'I know they said they were going to introduce new technology, but this isn't quite what I expected.'

Listening

Task 9 Listen to this conversation in which Charles, the Information Services Manager in an American insurance company, talks about the steps involved in making a document available to users via document image processing. Put the steps in the right order

1 ☐ Index is stored.
2 ☐ Quality of scan is checked.
3 ☐ Envelope is opened by a machine.
4 ☐ Temporary key number is generated and written on the document.
5 ☐ IMS index transaction and customer name is entered into the computer.
6 ☐ Mail arrives in the mailroom.
7 ☐ Temporary document number is entered into the computer to link it with the previously-generated index.
8 ☐ Document is scanned.
9 ☐ Document pages are removed and arranged by a clerk
10 ☐ Document can be accessed by users.
11 ☐ Computer supplies routing and indexing data.
12 ☐ Document pages are transferred to the mail analyst.

Task 10 Now listen again and answer the following questions.

1 How long does it take
   a for an index to be stored and a key number issued?
   b for a recent document to be retrieved?

2 Why does it take longer to retrieve a document processed more than a year ago?

3 Note down:
   a the number of square feet of office space saved.
   b the number of employees freed from file maintenance
   c the approximate net saving per year in pounds.

Speaking

Task 11 We have looked at some of the benefits of replacing people with computers in the office. What are the negative aspects of this policy?

Writing

Task 12 Write two paragraphs, one listing the benefits, the other listing the negative aspects of replacing people with computers

Information systems

Reading

Task 13 Before reading the text, try to decide which of the following definitions best describes a management information system:

a a system for supplying information to management
b a system for managing information
c a system which supplies information about management

Task 14 Decide whether these statements are true (T) or false (F), then read the passage to check your answers.

1 ☐ All businesses are interested in more or less the same information regardless of the nature of their operations.

2 ☐ The managing director of a company needs a lot more detailed information about the day-to-day operations than his executives do

3 ☐ Functional management require up-to-the-minute information so that they can take action to control events as they happen.

4 ☐ Information systems are usually computerized.

5 ☐ Transaction processing systems are usually the first systems to be installed.

Information systems

The objective of information systems is to provide information to all levels of management at the most relevant time, at an acceptable level of accuracy, and at an economical cost.

Individual businesses require information according to the nature of their operations. A car manufacturer is particularly interested in the extent of competition from overseas manufacturers in the home market and competition from other home-based manufacturers. A tour operator is concerned about purchasing power and its effect on holiday bookings and the political situation prevailing in the various countries.

As a general guide, the detail contained in reports containing information varies according to the position of the recipient in the hierarchical management structure. The chairman and managing director of a company require details of operations which are broad in scope and which concentrate on key factors pinpointing economic and financial trends. Functional management require information relating to the departments they are responsible for in sufficient detail to enable them to apply whatever measures are required to bring situations into line with requirements. They require information relating to events as they occur so that appropriate action can be taken to control them.

Information systems are often computerized because of the need to respond quickly and flexibly to queries. At the bottom level in the information hierarchy are the transaction processing systems, which capture and process internal information, such as sales, production, and stock data. These produce the working documents of the business, such as invoices and statements. Typically, these are the first systems which a company will install. Above the transaction-level systems are the decision support systems. These take external information – market trends and other external financial data – and processed internal information, such as sales trends, to produce strategic plans, forecasts, and budgets. Often such systems are put together with PC spreadsheets and other unconnected tools. Management information systems are at the top of the hierarchy of information needs. The MIS takes the plans and information from the transaction-level systems to monitor the performance of the business as a whole. This provides feedback to aid strategic planning, forecasting, and/or budgeting, which in turn affects what happens at the transactional level.

Task 15

Draw a diagram to show how information is processed by information systems, as described in the last paragraph. Your diagram should show the hierarchy of systems and should include examples of the kind of information involved at each stage in the process. Use arrows (→) to indicate the flow of information.

Writing

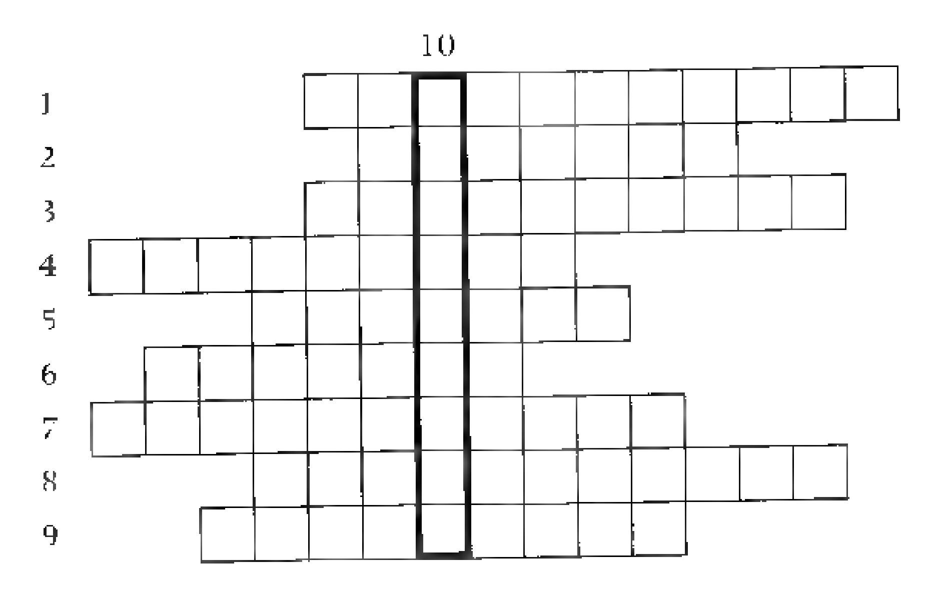
Task 16

Using your completed diagram from Task 15, write a paragraph explaining how information is processed by information systems. Do not look back at the text itself.

Word-play

Task 17

Complete the puzzle and find the key word in 10 down.



Across

1 The 'I' of MIS. (11)
2 Another term for a VDU. (7)
3 See **8**.
4 An A/D ___ changes analog signals into digital signals. (9)
5 The 'D' of VDU. (7)
6 The decision ___ systems combine information from outside and inside an organization to produce strategic plans and forecasts. (7)
7 Voice ___ systems permit people to talk to computers. (11)
8 and **3** ___ ___ systems capture and process information generated within an organization (e.g. sales and production data). (11,10)
9 Converted from an analog to a digital signal. (9)

Down

10 The amount of deskspace (or floorspace) taken up by a computer. (9)

Language focus H

The passive

Passives are very common in technical writing where we are more interested in facts, processes, and events than in people. We form the passive by using the appropriate tenses of the verb *to be* followed by the past participle of the verb we are using.

Examples:

Active

1 *We sell computers.* (simple present)
2 *Babbage invented 'The Analytical Engine'.* (simple past)

Passive

1 *Computers* ***are sold***. (simple present)
2 *'The Analytical Engine'* ***was invented*** *in 1830.* (simple past)

Facts and processes

When we write or talk about facts or processes that occur regularly, we use the present passive.

Examples:

1 *Data* ***is transferred*** *from the internal memory to the arithmetic logical unit along channels known as buses.*
2 *The other users* ***are*** *automatically* ***denied*** *access to that record.*
3 *Distributed systems* ***are built*** *using networked computers.*

Exercise 1

Read the text below, which describes the insurance company's procedure for dealing with PC-users' problems. Fill in the gaps using the correct form of the verb in brackets.

All calls [1] ______________ (register) by the Help Desk staff. Each call [2] ______________ (evaluate) and then [3] ______ (allocate) to the relevant support group. If a visit [4] ______ (require), the user [5] ______________ (contact, by telephone, and an appointment [6] ______________ (arrange). Most calls ______________ (deal with) within one working day. In the event of a major problem requiring the removal of a user's PC, a replacement can usually [8] ______________ (supply).

Exercise 2

Fill in the gaps in the following sentences using the appropriate form of the verb in brackets.

1 The part of the processor which controls data transfers between the various input and output devices ______ (call) the control unit.

2 The address bus ______ (use) to send address details between the memory and the address register.

3 The pixel positions ______ (pass on) to the computer's pattern recognition software.

4 An operating system ______ (store) on disk.

5 Instructions written in a high-level language ______ (transform) into machine code

6 In the star configuration, all processing and control functions ______ (perform) by the central computer.

7 When a document arrives in the mail room, the envelope ______ (open) by a machine.

8 Once the index ______ (store) a temporary key number ______ (generate) and ______ (write) on the document.

Events

When we write or talk about past events, we use the past passive. Let us look at some examples

Examples:

1 *COBOL **was** first **introduced** in 1959.*
2 *Microsoft **was founded** on the basis of the development of MS DOS.*
3 *The organization **was created** to promote the use of computers in education*

Exercise 3

Fill in the gaps in the following sentences using the appropriate form of the verb in brackets.

1 Microsoft ______ (found) by Bill Gates.

2 C language ______ (develop) in the 1970s.

3 During that period, enormous advances ______ (make) in computer technology.

4 The following year, twice as many PCs ______ (sell).

5 In the 1980s, at least 100,000 LANs (set up) in laboratories and offices around the world.

6 The first digital computer (build) by the University of Pennsylvania in 1946.

7 Last year, more software companies (launch) than ever before

8 IBM's decision not to continue manufacturing mainframes (reverse) the year after it (take).



Computers in education



Start-up

Task 1

Make a list of the ways computers are used in education.

Speaking

Task 2

Discuss these questions:

1. How are computers used in your school?
2. What do you think the following terms mean?
   - **a** further education
   - **b** open learning
   - **c** flexible learning

Reading

Task 3

Read quickly through the text opposite to find:

1. the overall purpose of NCET.
2. another expression meaning 'educational technology'.
3. whether NCET produces learning materials
4. how many priorities NCET's Schooling Directorate has.
5. three groups of people helped by NCET's Vocational Training programme.
6. three examples of new and developing technologies that the Council gives advice about.

National Council for Educational Technology

The Council's purpose is to bring beneficial change to the processes of learning in education and training through the development and application of educational technology.

Educational technology – or learning technology, as it is sometimes known – embraces everything from the way computers, satellites, and interactive video are used in schools, colleges, and industry to issues of copyright and flexible learning. Focusing on the learner, our purpose is to support change in the ways we learn by applying the benefits of educational technology – especially the new information technologies – to the process of learning.

We design and produce learning materials in all subjects to support education and training. We carry out research and manage projects, offer consultancy on technical matters, support training for trainers and teachers, and offer expertise in areas such as open and flexible learning, resource management, and educational software. We provide a comprehensive information and enquiry service.

Information Technology in schools

Through its I.T. in Schools Programme, NCET's Schooling Directorate is pursuing four priorities:

- to identify and promote and spread good practice in the use of new technologies
- to provide professional guidance to teacher trainers so that they can help teachers and schools in managing I.T. and in applying it to all areas of study
- to develop high-quality curriculum materials and encourage other publishers to do the same
- to give particular support for those concerned with children and young adults with special educational needs, including the handicapped.

Learning after school and at work

NCET's Training Directorate focuses on the needs of those wishing to learn after the school leaving age. Projects under the Vocational Training programme include looking into the training needs of women, older workers, and those who use information technology to work from home. In further education, lecturers and senior managers are being helped to plan for I.T. and changing client needs. For industry, our work has included language training in the run-up to 1992, and the application of artificial intelligence systems to training. This directorate also takes the lead in important trans-sectoral issues such as open and flexible learning, copyright, and the use of computers in careers guidance.

Technical expertise

Keeping abreast of developments in technology and maintaining a national expertise on standards and specifications is the work of NCET's Technical Consultancy Directorate. Through links with other organizations, it identifies issues associated with the adoption of new technologies and, where appropriate, carries out projects to assess or develop their potential in education and training. It has a watching brief and provides consultancy on new and developing technologies such as satellites, CD-ROM, and interactive video. Current projects involve the examination of the use of educational software in schools, the use of massive storage systems, and the use of satellites in education and training. The Directorate also produces guidance to users on a wide range of technology, from desk-top publishing and remote sensing to teleconferencing and audio-visual systems.

Task 4 Imagine that you represent NCET and that a newspaper reporter is interviewing you. Use the information in the text to complete the dialogue *in your own words*.

Reporter What exactly does the term 'educational technology' cover?

You

Reporter I see. Apart from offering advice on technical matters, what other services do you provide?

You

Reporter Does the I.T. in Schools Programme help teachers as well as students?

You Yes

Reporter What about those with special educational needs?

You

Reporter What responsibility does the NCET's Training Directorate have?

You

Reporter Does that include helping people in industry?

You Yes.

Reporter One last question. What kind of work is the Technical Consultancy Directorate doing in schools at the moment?

You

Task 5 Make a list of the 'new information technologies' mentioned in the text. Do you know what all the terms mean?

Task 6 Using the line references given, look back in the text and find words or phrases in the text which have a similar meaning to:

1. includes (lines 1–5)
2. advantages (lines 5–10)
3. covering everything (lines 10–15)
4. course (lines 20–25)
5. physically or mentally challenged (lines 25–30)
6. approach (lines 30–35)
7. up-to-date with (lines 35–40)
8. instructions to monitor (lines 40–45)

Writing

Task 7 Translate the last paragraph of the text (beginning 'Keeping abreast of...') into your language.

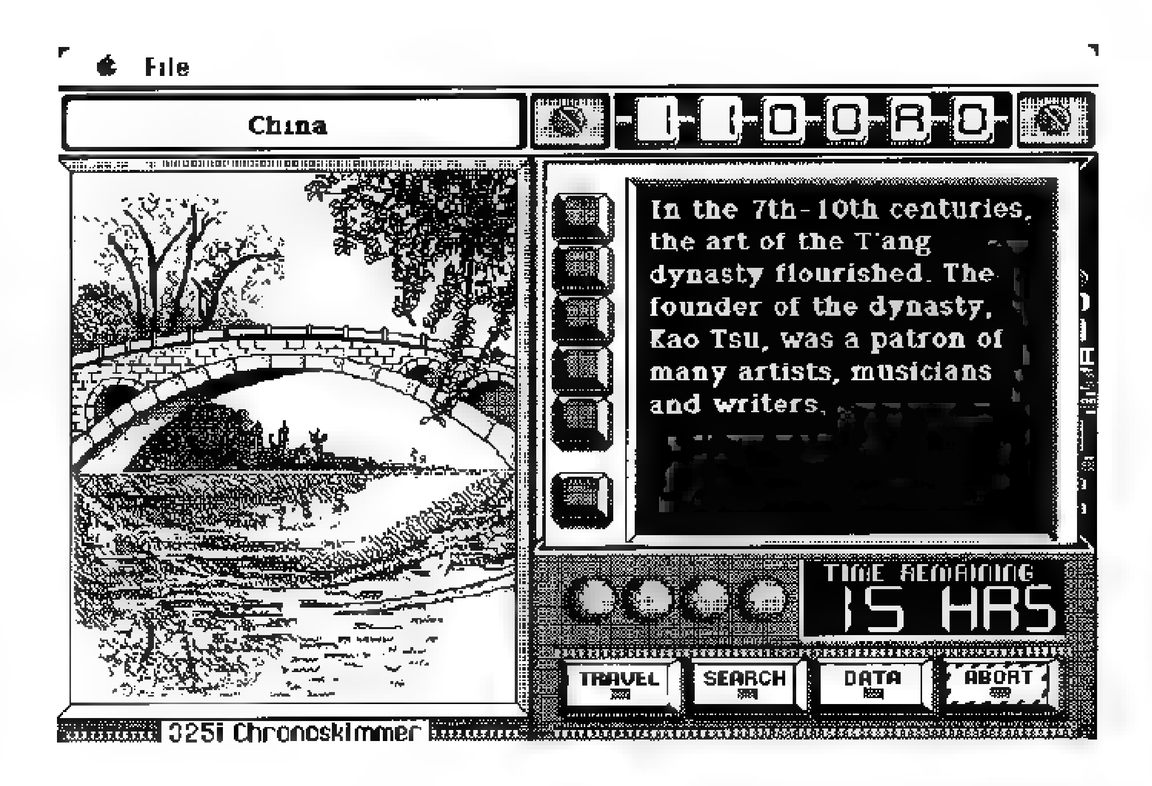
Speaking

Task 8

You represent the National Council for Educational Technology. You have been asked to talk to a group of teachers about the work of the Council. Make brief notes from the text, then prepare a short presentation.

In pairs or small groups take turns to make your presentation. If you are listening to a presentation, check that it is accurate and that it covers the main points mentioned in the text.

CALL



Listening

Task 9

Tony Longstone, an expert on educational technology, is answering questions from teachers about Computer Assisted Language Learning (CALL). Listen to the discussion and decide whether the following sentences are true (T) or false (F).

1 ☐ Most uses of computers in language education can be described as CALL.

2 ☐ There is no point in buying a computer for CALL, if there is no commercially available software for that computer or operating system.

3 ☐ The number of computers you buy will depend on two factors: the number of students there are, and the amount of physical space available.

4 ☐ It is possible to have CALL using only one computer.

5 ☐ The ideal way to organize CALL is to have one computer in each classroom.

6 ☐ The CALL resource should be free to students if possible.

Listen again. Change the sentences that are false to make them true.

Task 10 Read this extract from the tapescript and try to fill in the missing words.

LONGSTONE: Well, given sufficient [1] ________, it's a good idea to have some computers [2] ________ for teachers in the teachers' room. Also, it's very useful to have a self-access [3] ________ for use by students. In both cases, they – teachers and students – can gain a lot of confidence and [4] ________ by having free access to the [5] ________. Finally, an excellent idea is to have one computer with a large screen functioning as an electronic [6] ________ for messages prepared for students and staff. This should be located in a public part of the school or college, such as the hall or [7] ________.

Now listen to the last part of the recording again and check your answers.

Speaking

Task 11 Discuss the following questions:

1 What do you think are CALL's main advantages and disadvantages as a way of learning foreign languages?
2 Do you think it is possible that one day language teachers will be completely replaced by computers?

Reading

Task 12 A teacher has been looking at some publicity material for the Adam & Eve program. Read the material and fill in the gaps in the teacher's notes opposite.

Choose your own texts ▾

ADAM & EVE allows you to create exercises based on any text you want. The text could be from the course-book you are using, from a reader, from a newspaper – whatever your students are interested in.

Analyse your texts ▾

ADAM & EVE will analyse the vocabulary of the text according to the database of word frequency contained within the software. From this analysis you get a precise idea of the level of difficulty of a text, you can compare one text with another text, and you can see whether it fits in with the syllabus your students are working to.

Generate exercises ▾

ADAM & EVE will then create a wide variety of exercises based on this analysis. These exercises, which are easily and quickly generated, can be presented to your students either as printed worksheets – you will be provided with the answers on a separate sheet – or can be put on to a floppy disk so that a performance will be automatically evaluated and the score recorded. ▶

Simple to use ▾

No previous experience with computers is necessary. If you can type using a word processor (or know someone who can!) you will have no difficulty in putting your texts into the software. The whole program is 'menu driven' in any one of five languages so you will always know where you are and it will be obvious from the screen where you can go next. There is a full and clearly written manual to help you get started. Once you are familiar with the basic workings, don't forget to go back to the manual to learn about the program's finer points.

Something for the whole school ▾

Up to twenty-five different teachers can work with ADAM & EVE. The program will keep each teacher's texts and the exercises generated on those texts in separate files which are only accessible using that teacher's password. ■

Adam & Eve

1 You can create exercises from any text e.g.
________, ________, ________.

2 You can ________ a text to assess its, ________ to ________ it to another text, or to determine its suitability for a given ________.

3 Exercises can be easily ________, and can be presented to students either as ________ or on ________.

4 No ________ of computers is needed. The program is '________ driven' in any of ________ languages. The package comes with a comprehensive ________.

5 Up to ________ teachers can use the program. It can store all generated texts and exercises in separate ________. Each teacher has a personal ________ to ________ his or her files.

Task 13 Choose the correct word to complete each sentence. You may have to change some words slightly.

1 *create, created, creating, creation, creativity*

a The ______________ of this database will give us a huge advantage over our competitors in the long run.

b The procedure for ______________ a new file is very simple.

c The new position we are advertising is going to require someone with enormous ______________.

2 *generate, generated, generative, generation*

a Exercises can be quickly ______________ using this program.

b Our company is working on a new ______________ of software products.

c This development is sure to ______________ great interest.

3 *access, accessed, accessible, accessibility*

a All user requests to ______________ a database are handled by the database management system.

b ______________ to the computer room is restricted to authorized personnel.

c Those files are not ______________ unless you know the password.

4 *analyse, analysed, analysis, analyst*

a When a text is ______________, all pronouns, prepositions, conjunctions, and verb forms are automatically identified.

b This ______________ shows that most PC users are not aware of the full potential of the software products they buy.

c The DBMS first receives the request and ______________ it for syntax errors.

Writing

Task 14 Imagine you are in charge of language teaching in an institute. Write a short report to the principal recommending the introduction of CALL.

Organize your report as follows:

Paragraph 1 explain what CALL is.

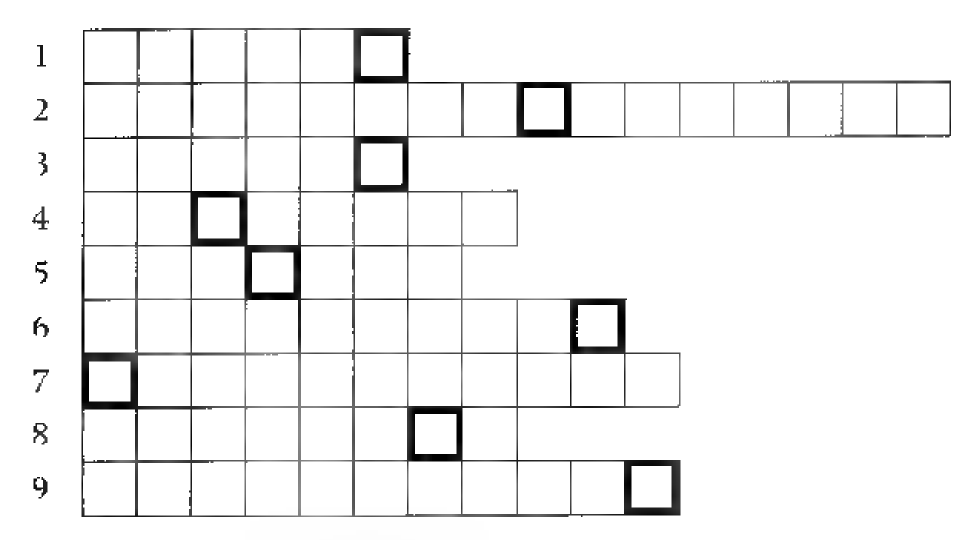
Paragraph 2 describe the different options available (e.g. one computer per class; a special classroom with several networked PCs).

Paragraph 3 recommend one of the options you mentioned in paragraph 2.

Word-play

Task 15

The clues below contain anagrams of words from this unit. Enter the words in the grid, then solve the anagram in the **bold** boxes to find the hidden word.



1. To connect to a database. (scaces)
2. A technology which allows telephone communication between several people at the same time. (ctoenlfeergcnien)
3. Describing a device connected over a WAN. (emtore)
4. A large store of computerized data. (aaaestdb)
5. Examine carefully. (easnaly)
6. Concerning the qualifications, etc. needed for a trade or profession. (lvaoncoait)
7. Describing a system in which the computer responds to the user's instructions. (vercaitneit)
8. A VDU and keyboard. (lnmrteia)
9. A program that manipulates tables of figures. (steerpahdse)

Hidden word clue

Device used for relaying telephone messages or radio and TV signals. (9)

Language focus I

Giving examples

When the main aim of a text is to inform the reader about a subject, the writer will often use examples, either to explain a point or to illustrate an idea or argument. When giving examples, it is important to differentiate between the idea itself and the illustration of the idea.

Some expressions for introducing examples are shown in the table below.

for example (e.g.)	examples of	shown by
for instance	instances of	exemplifies
an example (of this)	cases of	shows
as an example	illustrations of	illustrates
such as	exemplified by	a second, third example,
like	illustrated by	etc.
including	seen in	

Examples

1. *Office workers use many computer applications* ***such as*** *word processing, spreadsheets, and databases.*
2. *Computers have made radical changes in preparing income tax returns.* ***For example***, *in some countries you can now send your income tax return on disk.*
3. *Students can make good use of computer technology at school. Essay writing,* ***for instance***, *can be done using a word-processing program.*

Note Sometimes the markers follow the example, separated by commas, as in 3 above.

Exercise 1

The list below is made up of five groups of words consisting of five main categories and examples of each category. Find the word groups and then write sentences to show the relationship between the groups of words. Use a different marker for each sentence. One has been done for you.

trackball	*bus*	PC
mainframe	output device	*star*
microcomputer	printer	VDU
network configuration	APL	C
programming language	COBOL	*ring*
mouse	stylus	computer
input device		

Example.

Ring, bus, and star are all examples of network configurations.

Exercise 2

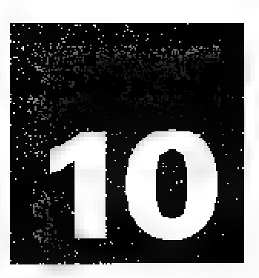
Read the following sentences. Circle the marker and underline the main idea for which the example is given. The first one has been done for you.

1 Networks also allow users in one locality to share expensive resources, such as printers and disk-systems. (Unit 6)
2 There are a handful of clipboard computers now on the market, including GRIDPad, which is sold in the US. (Unit 2)
3 The PC passes the query, written in a special language (e.g. Structured Query Language – SQL) to the mainframe, which then parses the query, returning to the user only the data requested. (Unit 6)
4 Here's an example of a simple virus, the Lehigh virus. (Unit 7)
5 If you use a shared PC or a PC that has public access, such as one in a college PC lab or a library, be very careful about putting floppies into that PC's drives without a write-protect tab. (Unit 7)

Exercise 3

Not all texts present examples explicitly. In some cases, markers are not used. Read the paragraph below. Circle the main idea and underline the examples of that idea.

The widespread availability of computers has in all probability changed the world for ever. The microchip technology which made the PC possible has put chips not only into computers, but also into washing-machines and cars. Some books may never be published in paper form, but may only be made available as part of public databases. Networks of computers are already being used to make information available on a world-wide scale. (Unit 1)



Computers in medicine



Start-up

Task 1

Make a list of all the applications of computers you can think of which are related to medicine and patient care.

Reading

Task 2

Before reading the text opposite, try to answer the following questions.

1 The cards below contain a message. What do you think it is?
2 Why do you think the message was given in this form?
3 How could a computer help to convey messages like this?



Now read the text and check your answers.

EILEEN CARLETON HAS A whimsical talent for hand signals. When the 65-year-old stroke victim draws a vertical line in the air, her family knows she is referring to a very slim friend of her son.

But a lexicon of hand gestures — no matter how inventive — and the few dozen words left in Carleton's vocabulary following her stroke are inadequate for conveying even the most basic wishes, observations, or questions to her family. Through a pilot study at the School of Medicine, however, Carleton has learned to communicate using a specially designed computer program that has restored not only her ability to express herself, but also, family members and therapists say, her enthusiasm for life.

The stroke that Carleton suffered in 1985 damaged the portion of her brain where words and speech are processed, leaving her with a condition known as aphasia, or the inability to use language. While she is able to comprehend much of what people say to her, she cannot formulate her thoughts into coherent phrases or sentences.

Using the computer program, she can select from hundreds of pictures that represent people, objects, actions, and descriptive qualities and arrange them in sequence to communicate thought, obviating the need to use words.

'When Eileen first entered the study, she depended on her husband Steve to figure out what she wanted to say from her gestures and facial expressions. All she could say was "Come on. You know!", with increasing frustration,' said Dr Cheryl Goodenough Trepagnier, associate professor of rehabilitation medicine.

The computer program used in the Tufts study was developed in conjunction with the Palo Alto, California, Veterans Administration Medical Center and grew out of research in the 1970s at the Boston Veterans Administration Hospital.

'Researchers had found that chimpanzees, whose brains lack specialized language centers, could engage in a kind of communication using plastic tokens that represented different objects and actions,' Dr Trepagnier said. 'We wondered whether aphasics — whose language processing areas are damaged — could benefit from the same idea.'

On small cards, researchers drew symbols representing different people, objects, and actions and trained aphasic patients to select and arrange the cards to form statements or questions. By selecting cards showing a woman, a person walking, a store, and a chicken for example, an aphasic patient could ask his wife to go to the grocery store to buy some poultry.

'Some patients become quite adept at using the cards,' Dr Trepagnier said. 'But as the number of cards increased, it became awkward and time-consuming to find the right cards and then put them back in the right order. Patients found the cards too cumbersome and didn't use them at home.'

In the mid-1980s, however, a computer program was developed that, like the cards, used pictures to represent ideas, but was easier to use. With the program, aphasic patients could select from hundreds of pictures simply by moving a computer mouse. Dr Trepagnier was among the first researchers to test the new software on aphasics.

'At first, there was a great deal of doubt over whether aphasics would be able to use computer,' Dr Trepagnier said. 'But we found that many took to the computer quite easily. As they became more proficient on the computer, some showed gains ►

in their overall self-confidence, as well.

It's hardly an exaggeration to say that the program transformed Carleton's life. In the aftermath of her stroke, Carleton 'was so despondent she sat on the couch all day and did nothing,' said her speech therapist, Evelyn Chedekel. 'But as soon as she learned that she's capable of communicating with the computer, her whole world changed. Now she can introduce topics, rather than hoping that people will guess what's on her mind. When her husband passed away suddenly, she was able to carry on.'

Encouraged by the results thus far, Dr Trepagnier will study ways of expanding the computer program's capabilities. For unknown reasons, many aphasics have more trouble conceptualizing verbs than nouns. Making the intellectual connection between a picture of a sailboat and the idea of a sailboat is easier than connecting a picture of a boy running to the idea of running. Trepagnier hopes to overcome this difficulty by designing a program that enables patients to see computer images in motion. ■

Vocabulary

whimsical (l. 2) – fanciful, highly imaginative
lexicon (l. 7) – vocabulary
dozen (l. 9) – about twelve
stroke (l. 10) – sudden attack of illness in the brain, causing loss of speech and movement
took to (l. 107) – developed an ability with
passed away (l. 126) – died

Task 3

Decide which of these titles best sums up the content of the text.

1 A new way to communicate for stroke victims
2 Stroke victims: computers that care
3 New technology comes to the rescue of stroke victims

Task 4

Read this summary of the text and fill in each gap with an appropriate word.

Eileen Carleton's life has been completely transformed by Dr Trepagnier's computer program. Whereas she used to be entirely [1] ________ on her husband to deduce what she wanted to say, now she is able to [2] ________ her own ideas. Before, she had to hope other people would [3] ________ what she was thinking. Now she is [4] ________ of starting a conversation with others.

Dr Trepagnier's program was [5] ________ from research on symbolic communication by chimpanzees, which [6] ________ specialized language areas in their brains. As these language-processing areas are also known to be [7] ________ in human aphasics, the same idea of using visual symbols to represent different people, objects, and actions was thought likely to be effective.

Using cards to show these symbols proved [8] ______ for most patients, but the introduction of computer technology has greatly [9] ______ the use of the system by aphasics, whose lives have been immeasurably [10] ______ since the invention of this program

Task 5

Each of the following sentences from the text is followed by two paraphrases. Decide which paraphrase (**a** or **b**) is closer in meaning to the original comment. Remember to look at the comments in their original context

1 But a lexicon of hand gestures – no matter how inventive – and the few dozen words left in Carleton's vocabulary following her stroke are inadequate for conveying even the most basic wishes, observations, or questions to her family. (line 7)

- **a** Eileen Carleton's hand gestures and words are not clear enough to allow her thoughts to be understood
- **b** Eileen Carleton does not have enough hand signals and words to express her thoughts.

2 While she is able to comprehend much of what people say to her, she cannot formulate her thoughts into coherent phrases or sentences. (line 27)

- **a** Eileen understands quite a lot of what people are saying to her and knows what she wants to say. However, she cannot translate her thoughts into understandable messages.
- **b** Eileen finds it difficult to choose the right words and sentences to express herself while she is concentrating on what people are saying to her.

3 As they became more proficient on the computer some showed gains in their overall self-confidence, as well. (line 108)

- **a** Some people found that their growing confidence about using the computer made them generally more self confident
- **b** The more people used their computer, the more self-confident they became.

4 It's hardly an exaggeration to say that the program transformed Carleton's life. (line 113)

- **a** The program changed Carleton's life in some respects.
- **b** The program completely changed Carleton's life.

Task 6

Match each word in the list on the left with the appropriate synonym on the right.

1	inventive (line 8)	**a**	deduce
2	inadequate (line 11)	**b**	awkward
3	select (line 33)	**c**	take part in
4	obviating (line 37)	**d**	depressed
5	figure out (line 41)	**e**	insufficient
6	engage in (line 59)	**f**	completely changed
7	cumbersome (line 89)	**g**	skilled
8	proficient (line 109)	**h**	creative
9	transformed line 114	**i**	choose
10	despondent (line 117)	**j**	removing

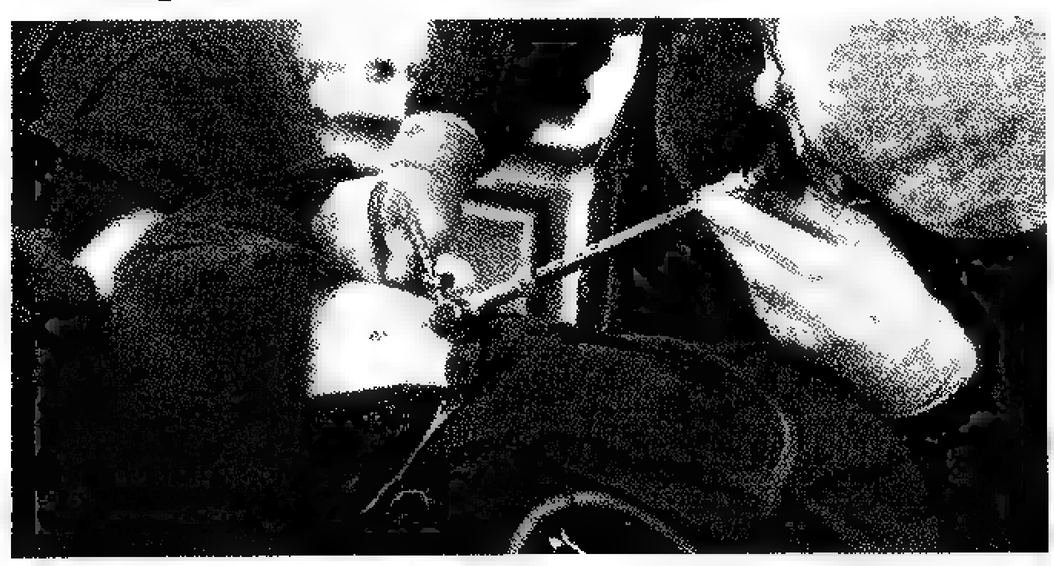
Writing

Task 7

Translate paragraph 6 (beginning 'The computer program used in the Tufts study ...') into your own language.

Reading

Task 8



Work in pairs, A and B. **Student A** should read text 1 only. **Student B** should read text 2 only. Without looking at the text you have read, tell your partner about it. Write down what your partner tells you about his/her text, then compare it with the original. How accurate is it?

1

Robot eye for surgery

Laparoscopy is a procedure in which a camera is pushed through a small hole in the abdominal wall. It allows a surgeon to operate by television, with instruments inserted through a second hole. The small size of the incisions reduces the trauma for patients and speeds up recovery. Until recently, the procedure has required the presence of a second doctor to guide the camera for the surgeon.

A new development now facilitates this procedure. A robot manoeuvres the camera in response to the surgeon's head. Four tiny transmitters worn on a headband, send radio signals to a base unit. As the surgeon moves his head left or right, up or down, forwards or backwards, the robot causes the camera to track his movements, enabling him to view the exact area he wishes to see.

2

Robot surgery for eye

Techniques derived from virtual reality will soon allow surgeons to feel as well as see the inside of the eye during an operation. During the operation, the surgeon manipulates a set of controls known as the master. These are connected through a high performance computer to the robot. The robot's limbs move in exactly the same way, except that the movements can be scaled down as much as a thousand times, thus eliminating hand tremor and reducing damage to the eye.

The computer also creates a three-dimensional view of the inside of the eye which the surgeon can see wearing a virtual reality helmet and 'feel' via a sensory feedback system which emulates the forces generated by cutting with a surgical tool.

Data storage and management

Listening

Task 9 



Listen to this extract from a programme called *Science Made Simple*, in which a hospital administrator answers questions about the hospital database. As you listen, choose the correct answer for each question.

1 How many characters of stored information are generated each year by the database at Grovemount Hospital?
  - a More than 500,000.
  - b More than 50,000,000.
  - c More than 500,000,000
  - d More than 500,000,000,000.

2 How is the database organized?
  - a Like all other databases.
  - b Like any hospital database
  - c Differently from any other database.

3 How is information on patients stored?
  - a Each patient has a named file.
  - b Each patient has a record
  - c Each patient has a number of records within a personal file.

4 What do fixed-format records contain?
  - a Types of data that cannot be changed.
  - b Text only.
  - c Different types of data stored separately.

5 What happens when two people try to access the same data at the same time?
  - a The database management system cancels both queries.
  - b One user has to wait until the other has finished
  - c The Database Manager processes both queries at the same time and updates the database accordingly

Task 10 Read this extract from the tapescript and fill in each gap with an appropriate word.

INTERVIEWER: I see. Now, can you tell us what happens when the database is [1] ______?

ALEX COLLINS: Yes. Each [2] ______ [3] ______ is called a transaction. When a transaction enters the system for processing, the computer must [4] ______ related data from the database. At the end of the processing, the computer stores updated data to reflect the changes caused by the [5] ______.

INTERVIEWER: Could you give an example?

ALEX COLLINS: Yes, of course. Each time a patient is admitted to the hospital, the database must be updated to show his or her details. This is obvious. However, the database must also be updated to show that there is one less bed [6] ______. This will, in turn, affect summary [7] ______ data, such as bed [8] ______ for the month, and so on.

INTERVIEWER: OK. But you have lots of different people accessing the database at the same time, don't you?

ALEX COLLINS: It's a [9] ______ system, yes.

INTERVIEWER: Right. But what happens if two people access the same data at [10] ______ the same time?

ALEX COLLINS: It can't happen. In that situation, the database management system would [11] ______ access to one of the [12] ______ only.

Now listen again to the cassette and compare your answers.

Reading

Task 11 Before reading the text opposite, match the following words with their definitions:

1 logical record
2 field
3 physical record
4 internal schema
5 external schema
6 conceptual schema

a the collection of data transferred as a unit
b the user's permitted view of the data
c the logical design of the database
d an item of data such as a number, a name, or an address
e the way that the data is physically held
f the collection of data relating to one subject

Task 12 Before reading the text, try to answer these questions in pairs.

1 How many medical uses of a database can you think of?
2 What is a DBMS?
3 What is its function?

Now compare your answers with the information in the text.

Database management systems

Databases are used within a medical context for many purposes. For example, they are used to hold patient details so they can be accessed from anywhere within a hospital or network of hospitals. With the recent improvements in image compression techniques, X-rays and scan output
5 can also be held in databases and accessed in the same way.

These multi-user databases are managed by a piece of software called a database management system (DBMS). It is this which differentiates a database from an ordinary computer file. Between the physical database itself (i.e. the data as actually stored) and the users of the system is the
10 DBMS. All requests for access to data from users – whether people at terminals or other programs running in batch – are handled by the DBMS.

One general function of the DBMS is the shielding of database users from machine code (in much the same way that COBOL shields programmers from machine code). In other words, the DBMS provides a view of the data
15 that is elevated above the hardware level, and supports user-requests such as 'Get the PATIENT record for patient Smith', written in a higher level language.

The DBMS also determines the amount and type of information that each user can access from a database. For example, a surgeon and a hospital
20 administrator will require different views of a database.

When a user wishes to access a database, he makes an access request using a particular data-manipulation language understood by the DBMS. The DBMS receives the request, and checks it for syntax errors. The DBMS then inspects, in turn, the external schema, the conceptual schema, and
25 the mapping between the conceptual schema and the internal schema. It then performs the necessary operations on the stored data.

In general, fields may be required from several logical tables of data held in the database. Each logical record occurrence may, in turn, require data from more than one physical record held in the actual database. The
30 DBMS must retrieve each of the required physical records and construct the logical view of the data requested by the user. In this way, users are protected from having to know anything about the physical layout of the database, which may be altered, say, for performance reasons, without the users having their logical view of the data structures altered.

Task 13

The steps below show how a DBMS deals with an access request. Find the relevant section in the text, then put the steps in the correct order.

The DBMS:

1 ☐ inspects the mapping between the conceptual schema and internal schema

2 ☐ checks for syntax errors

3 ☐ inspects the external schema

4 ☐ receives the request

5 ☐ performs operations on the stored data

6 ☐ inspects the conceptual schema

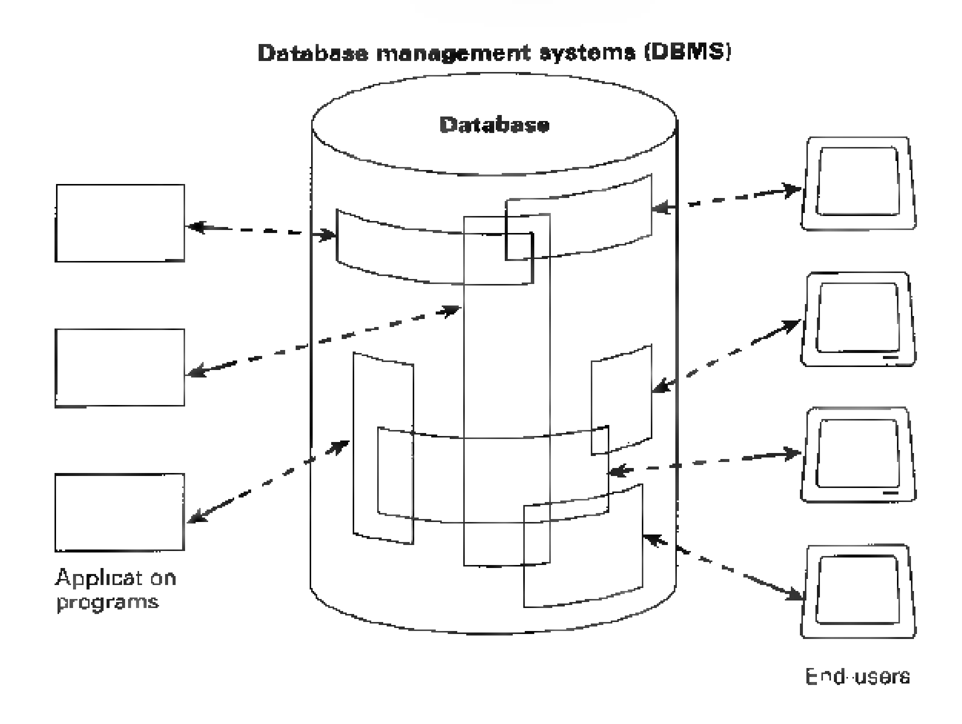
Speaking

Task 14

The diagram below represents a simplified database. In pairs, use the diagram to explain to your partner the following.

Student A: what a DBMS is and how it works
Student B: how an access request is processed

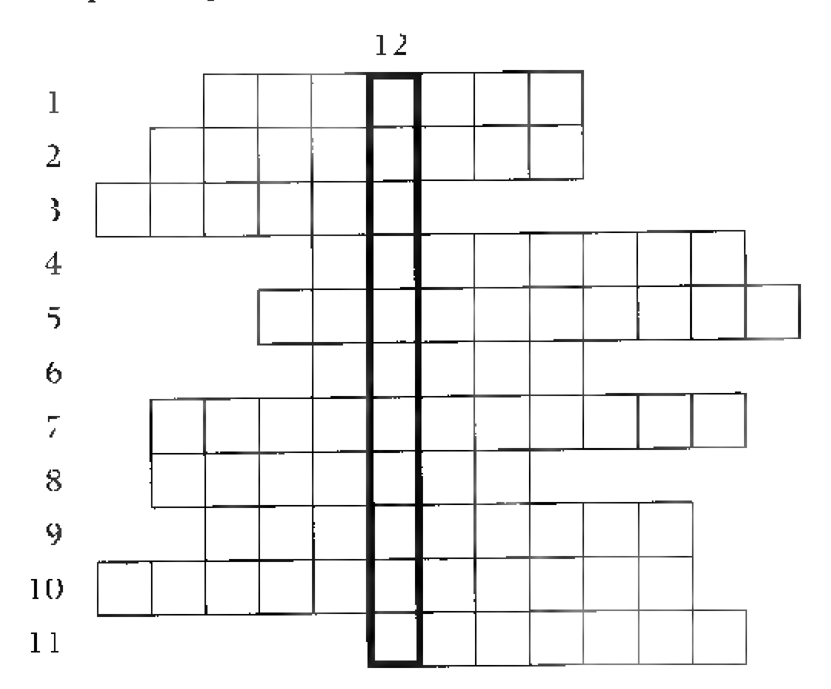
Try not to refer to the text. Use your own words.



Word-play

Task 15

Complete the puzzle and find the key word in 12 down.



Across

1 and **11** The creation of an artificial environment in the memory of a computer in which the user can apparently exist. (7,7)

2 and **3** The user's permitted view of the data in a database. (8,6)

4 The opposite of **2**. (8)

5 A surgical ______ is a tool used for carrying out operations. (10

6 and **10** A technique for reducing the amount of space that a graphics image will use when stored in computer memory. (5,11)

7 A program must be converted into this before a computer will read and process it. (7,4)

8 Programs that run ____-______ do not involve any terminal or user interaction. (2-5)

9 Used to describe computer systems that allow access by more than one user simultaneously. (5,4)

10 See **6**

11 See **1**.

Down

12 A device for sending a radio message. (11)

Language focus J

Explanations and definitions

Texts containing technical terminology frequently contain definitions and explanations. This is particularly the case if the text is aimed at non-experts or students of technical subjects, or if the purpose of the text is to inform specialists about new developments.

1 **Common words and expressions used in definitions or explanations are listed below.**

is/are	by ... we mean
means	by ... is meant
is taken to be	in other words
denotes	that is (to say)
is/can be defined as	

Examples:

1. *A computer* ***is*** *an electronic device.*
2. *Printers* ***are*** *output devices.*
3. *The term computer* ***refers to*** *the processor plus the internal memory.*
4. *A microchip* ***can be defined as*** *a tiny piece of silicon or similar material carrying an integrated circuit.*
5. *By peripherals* ***we mean*** *those devices attached to the computer.*

2 **Some definitions and explanations give further distinguishing characteristics by means of a defining relative clause.**

Examples:

1. *A computer is an electronic device* ***which/that processes information.***
2. *Tapes and disks are memory devices* ***which/that can be stored away for future use.***
3. *A programmer is a person* ***who/that prepares programs to solve problems.***
4. *The arithmetic-logical unit is the part of the CPU* ***where arithmetic and decision-making operations are done.***

Note. The relative pronouns used in this type of definition or explanation will be *who* or *that* for people, *when* for a period of time, *where* for a place or location, and *that* or *which* for things.

3 **Another way of defining or explaining is to use a noun, a noun phrase, or a clause separated from the rest of the sentence by commas or dashes.**

Examples:

1. *Computers* – ***electronic devices for processing information*** – *are now used in practically every aspect of life.* (noun phrase)
2. *Turnkey systems,* ***complete hardware/software products which are ready for use,*** *are available from many suppliers.* (clause)

Exercise 1

Study the following definitions. A definition usually includes three parts: the term to be defined, the group it belongs to, and the characteristics which distinguish it from other members of the group.

Term	Group	Characteristics
A core	is a ferrite ring	which is capable of being either magnetized or demagnetized.
Silicon	is a non-metallic element	with semiconductor characteristics.

Now analyse the following definitions and identify the different parts:

- **a** by circling the term
- **b** by underlining the group once
- **c** by underlining the characteristics twice

Example: *A computer is a machine with an intricate network of electronic circuits that operate switches or magnetize tiny metallic cores.*

1. Input is the information presented to the computer.
2. The term 'computer' includes those parts of hardware in which calculations and other data manipulations are performed, and the high-speed interval memory in which data and calculations are stored during actual executions of programs.
3. A 'system' is a mixture of integrated parts working together to form a useful whole.
4. Large computer systems, or mainframes, as they are referred to in the field of computer science, are those computer systems found in computer installations processing immense amounts of data.

Exercise 2

Now read the following sentences, which have all appeared in previous units, and analyse them in the same way as you did in Exercise 1.

1. The part of the processor which controls data transfers between the various input and output devices is called the control unit. (Unit 1)
2. A modem is a device which serves a dual purpose because it acts as a MOdulator (digital to analog) and a DEModulator (analog to digital). (Unit 3)
3. The compiler is a systems program which may be written in any language, but the compiler's operating system is a true systems program which controls the central processing unit (CPU), the input, the output, and the secondary memory devices. (Unit 4)
4. A variable is a quantity that is referred to by name, such as **a**, **b**, **c**, **d**, and **average** in the above program. (Unit 4)
5. A WAN is a network connected over long-distance telephone lines. (Unit 6)

6 ...a LAN is a localized network, usually in one building or in a group of buildings close together. (Unit 6)

7 A computer virus – an unwanted program that has entered your system without you knowing about it – has two parts, which I'll call the infector and the detonator. (Unit 7)

8 There are actually two kinds of antivirus programs: virus shields, which detect viruses as they are infecting your PC, and virus scanners, which detect viruses once they've infected you. (Unit 7)



Robotics

Start-up

Task 1 What function do you think each of these robots performs?

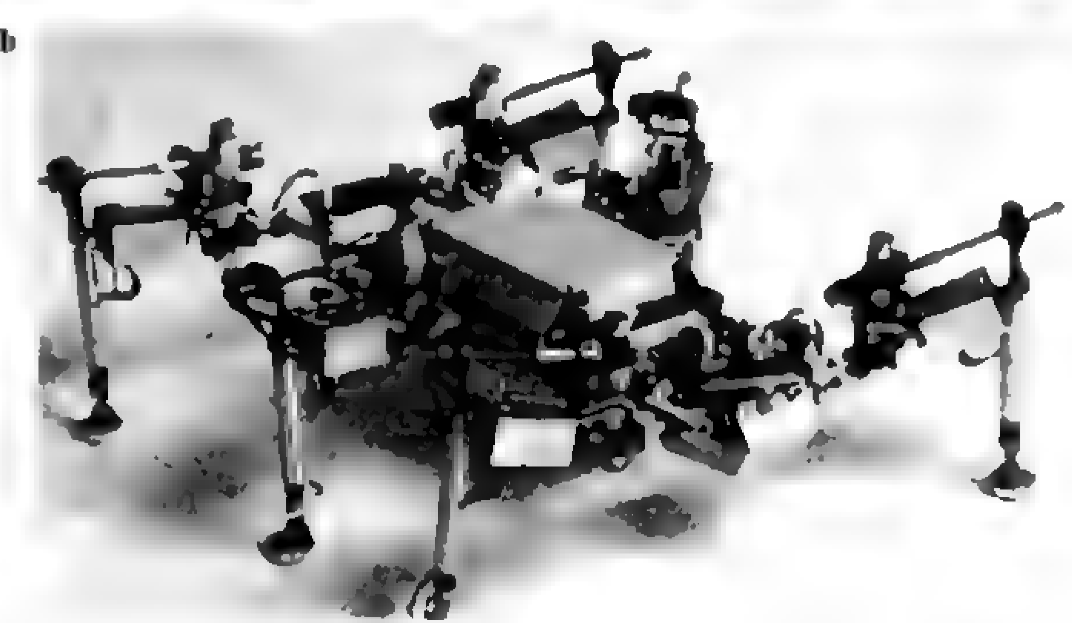
a



c



b



Listening

Task 2

You are going to hear a recorded guide to an exhibition on robotics, which begins with a brief history of robotics. The table below summarizes the history, but the events are in the wrong order. As you listen, match each event with the correct year.

	Year		Event
1	1921	a	'Shakey', mobile robot at Stanford Research Institute
2	1954	b	Perambulating vehicle: successful four-legged vehicle at Tokyo Institute of Technology
3	1967	c	Czech playwright, Karel Čapek, brings his play, *RUR* (*Rossum's Universal Robots*), to London
4	1967–9	d	One-legged hopping machine at Carnegie-Mellon University
5	1980	e	George Devol develops first programmable robot
6	1983	f	Quadruped personnel carrier at General Electric
7	1984	g	Odetics Inc. develop a six-legged robot

Task 3

Listen again and decide whether the following statements are true (T) or false (F) in relation to the information in the recording. If you think a statement is false, change it to make it true.

1 ☐ The history of robotics begins only in the twentieth century

2 ☐ In Capek's play, *RUR*, the robots become the masters and the humans become their servants

3 ☐ Today's industrial robots developed out of the work done by George Devol.

4 ☐ Shakey used bump detectors, a sonar range finder, and a video camera to avoid obstacles and move freely

5 ☐ Shakey had a built-in computer which controlled all its movements.

6 ☐ The success of GEC's four-legged machine depended on the skill of its driver.

7 ☐ The robot developed at the Tokyo Institute of Technology functioned completely automatically with no human control.

8 ☐ Odetics Inc.'s Odex I model did not need to be connected to a separate power-source.

Reading

Task 4

Some jobs are suitable for robots, while some must be done by people. Make two lists in the table below.

Types of jobs suitable for robots	Types of jobs done by humans

Now read this text to see if the author agrees with your ideas

The robotics revolution

Many of the robots in use today do jobs that are especially difficult for human workers. These are the types of jobs that require great strength or pose danger. For example, robots are particularly useful in the auto-manufacturing industry where parts of automobiles must be welded together. A welding tool used by a human worker weighs about 100 pounds or more and is difficult to handle. As mechanical supermen, robots may be called upon to do anything from moving heavy components between workstations on a factory floor to carrying bags of cement.

Spray painting is another task suited to robots because robots do not need to breathe. Unlike human painters, they are unaffected by the poisonous fumes. Robots are better at this task not because they are faster or cheaper than humans, but because they work in a place where humans cannot.

Third in the list of useful jobs for robots is the assembly of electronic parts. Robots shine at installing chips in printed circuit boards because of a capability that robots have that people don't. A robot, once properly programmed, will not put a chip in the wrong place. This automatic accuracy is particularly valuable in this kind of industry because locating and fixing mistakes is costly.

Earlier robots were usually blind and deaf but newer types of robots are fitted with video cameras and other sensing devices that can detect heat, texture, size, and sound. These robots are used in space projects, nuclear reactor stations, and underwater exploration research.

In their efforts to expand the range of robotic applications, researchers are looking beyond traditional designs to examine a variety of potential models from the biological world. The industrial arm is a classic example. Scientists have been able to model robots to imitate the vertebrate spine of a snake in order to paint the interior of automobiles. They have simulated the muscle structure and movement of an elephant's trunk in an attempt to create a robotic arm capable of lifting heavy objects. Scientists have also emulated the flexibility of an octopus where the tentacles can conform to the fragile objects of any shape and hold them with uniform, gentle pressure. A variation of this design can be used to handle animals, turn hospital patients in their beds, or lift a small child.

The challenge of equipping robots with the skills to operate independently, outside of a factory or laboratory, has taxed the ingenuity and creativity of academic, military, and industrial scientists for years. Simply put, robot hands – like robot legs, or eyes, or reasoning powers – have a long way to go before they can approach what biological evolution has achieved over the course of hundreds of millions of years. Much more will have to happen in laboratories around the world before robots can be compared to nature's handiwork.

In the meantime, the robotics revolution is already beginning to change the kind of work that people do. The boring and dangerous jobs are now assumed by robots. By the turn of the century, more and more humans will be required for tasks that machines cannot do. There are some industrialists who hope that by the year 2000 all their employees will be knowledge workers, no longer standing on assembly lines but rather sitting at desks and computer terminals to deal with information. These changes are already under way, and their pace accelerates every year.

Vocabulary

welded (l. 9) – (of pieces of metal) joined together by heating
shine at (l. 30) – do very well at
octopus (l. 66) – sea-animal with eight arms (tentacles)
has taxed (l. 77) – has made heavy demands on

Task 5

Summarize the reasons that certain jobs and environments are suitable for robots by completing the table below.

Job or environment	Reason
Welding	
Carrying components, etc	
Spray painting	
Assembling components	
In nuclear reactors, underwater, etc	

Task 6

These are answers to questions about the text. Write the questions.

1 About 100 pounds.
2 Because locating and fixing mistakes is costly.
3 In space projects, for example.
4 They are examining the potential of certain biological models.
5 No, they cannot be compared yet.
6 They will be doing intellectual rather than manual work

Task 7

Fill in this table with details of the animals mentioned in the text

	1	2	3
Animal			
Aspect being emulated			
Reason			

Task 8

Using the line references given, look back in the text and find words in the text which have a similar meaning to:

1 manipulate (lines 10–15)
2 correcting (lines 35–40)
3 expensive (lines 35–40)
4 increase (lines 45–50)
5 copy (lines 55–60)
6 reproduced artificially (lines 60–65)
7 easily damaged (lines 65–70)
8 gets faster (lines 105–110)

Writing

Task 9

Translate the sixth paragraph (beginning 'The challenge of equipping robots...') into your own language.

Speaking

Task 10

Look carefully at the table below showing past, present, and future applications of robotic systems, then discuss the following questions:

1 Do you agree with the predictions made?
2 What are the implications for society if these predictions become reality?

Applications of robotic systems

Domain	Pre-1990	1990s	Post-2000
Industry			
Production (welding, etc)	Widespread commercial applications		
Materials handling	Widespread commercial applications		
Assembly	First commercial applications	Widespread commercial applications	
Inspection	First commercial applications	Widespread commercial applications	
Office			
Mail handler	Widespread commercial applications		
Clerk	First commercial applications	Widespread commercial applications	
Cleaning	First commercial applications	Widespread commercial applications	
Professional		First commercial applications	Widespread commercial applications
Home			
Tutor	First commercial applications	Widespread commercial applications	
Housekeeper		First commercial applications	Widespread commercial applications
Companion		First commercial applications	Widespread commercial applications
Military			
Automatic pilot	Widespread commercial applications		
Scout			Widespread commercial applications
Soldier		First commercial applications	Widespread commercial applications
Ocean			
Explorer	Widespread commercial applications		
Constructor		First commercial applications	Widespread commercial applications
Space			
Stationary observer (on Mars)	Widespread commercial applications		
Rover (on Mars)		First commercial applications	Widespread commercial applications
Laborer (space station & moon)		First commercial applications	Widespread commercial applications

– Laboratory prototypes
– First commercial applications
– Widespread commercial applications

Robot characteristics

Reading

Task 11

Read this short text, then match each robot type with the appropriate definition.

Classification of types of robot

One way of classifying robots is in terms of their similarity to humans. An automaton is any machine capable of operating independently, such as a clothes dryer. A flexible machine is a special case of an automaton with different capabilities, that can be programmed as the need arises. An
5 example is a welding robot on the factory floor that can be programmed to participate in other production operations. A mobile robot is a flexible machine capable of moving freely in its own environment. It can partly select its own goals and communicates with other agents, including humans. An android or humanoid is a mobile robot whose structure
10 approximately resembles a human structure. Finally, a cyborg is a humanoid with organic structures. Cyborgs have some physiological structures similar to those of humans.

1	☐	Mobile robot	a	Machine capable of independent operation following a predetermined series of behaviours, e.g. a cuckoo clock
2	☐	Cyborg	b	Flexible machine capable of moving and communicating with humans, e.g. a sentry robot
3	☐	Automaton	c	Humanoid having both organic and inorganic structures, with some physiological similarity to humans
4	☐	Flexible machine	d	Mobile robot of human proportions
5	☐	Android Humanoid	e	Versatile, programmable automaton, e.g. an assembly robot

Now renumber the robot types, 1–5 (1 – the most similar to humans; 5 – the simplest).

Reading

Task 12

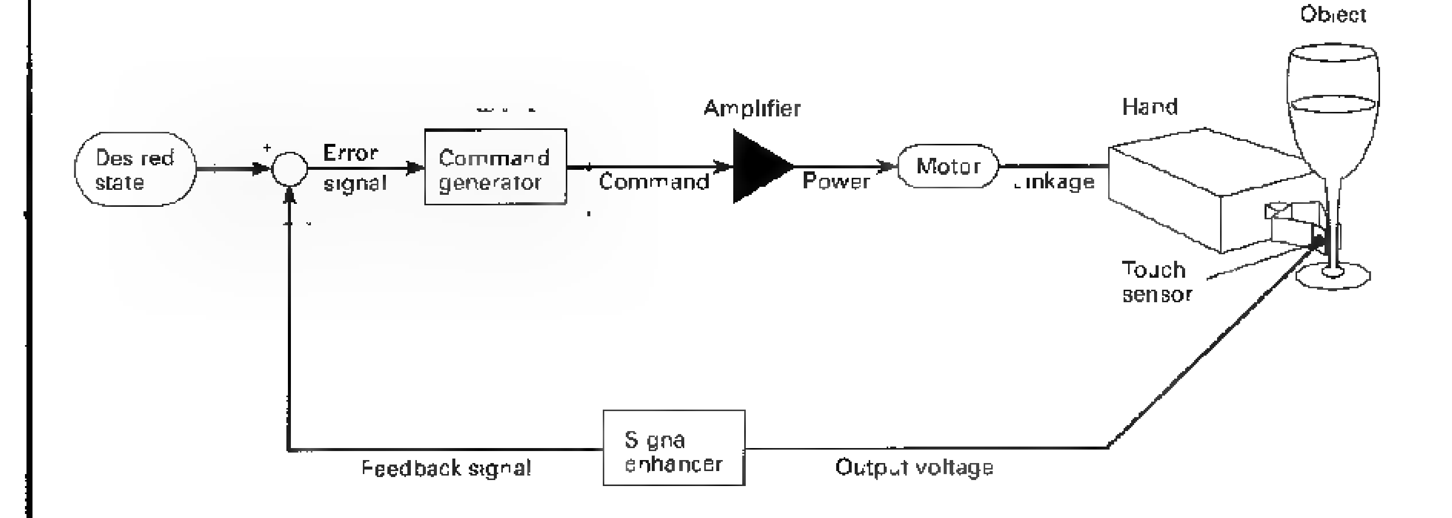
Using the diagram to help you, fill in the gaps in the text with the words given.

Co-ordination of control in robots

The diagram shows a [1] __________ system for the force required to [2] __________ an object. The desired level of force is fed into the control module, which [3] __________ it with the actual amount of force as indicated by the feedback signal. The discrepancy enters the command generator, which

determines the [4] ______________ and extent of adjustment necessary. The resulting command passes into an amplifier which produces power [5] ______________ to the level of the input signal. The power drives a motor [6] ______________ to some linkage such as a set of gears. The mechanical linkage in the robotic hand ultimately [7] ______________ the initial command signal into displacement at the fingertips.

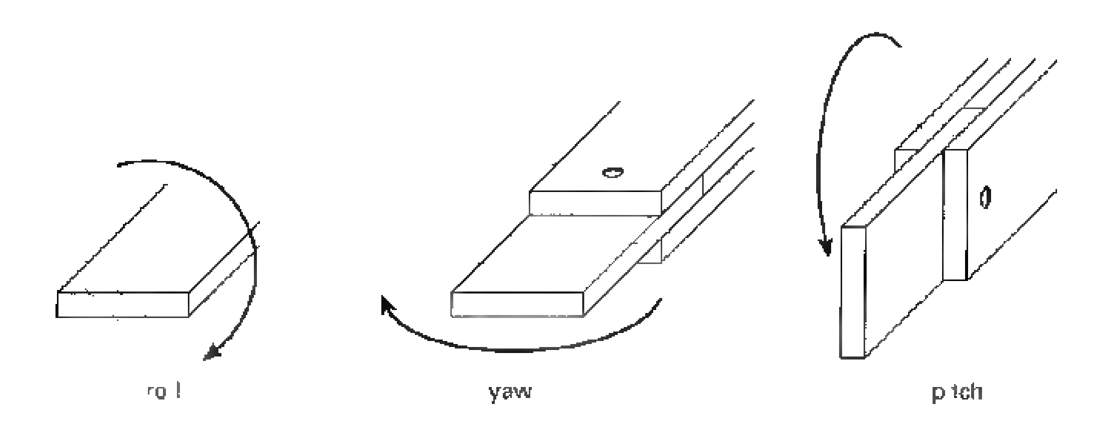
proportional	*grasp*	*attached*	*closed loop*
compares	*direction*	*converts*	



Speaking

Task 13

In pairs, design a simple robotic wrist and hand. Your device should have the three degrees of rotational freedom illustrated below and should be capable of grasping objects. Describe your invention to another pair



Writing

Task 14

Label the parts of your robotic wrist with letters or numbers, then write a paragraph explaining how it works.

Word-play

Task 15

Look at the lists and circle the word that is different from the others. Then explain why. The first one has been done for you.

1	mouse	keyboard	printer	OCR scanner	
	A printer is an output device				
2	palmtop	notebook	clipboard	briefcase	laptop
3	accumulator	register	address	bus	monitor
4	drive	floppy	hard	compact	
5	FORTRAN	COBOL	PASCAL	ASSEMBLER	
6	ring	loop	bus switched	star	
7	cyborg	automaton	sentry	android	
8	virtual	internal	external	conceptual	

Language focus K

Compound nouns

The language of computing in English contains an ever increasing number of compound nouns, that is a group of two or more nouns which act as a single noun.

Examples:

memory capacity — *an address bus* — *an arithmetic unit*
information systems — *a bar code scanner*

It is important to be able to recognize how such compounds are formed in order to understand what they mean.

The exact relationship between the words depends on the particular expression, but all these expressions have one thing in common: the last word in the chain says what the thing is, while the preceding word or group of words describes the thing. So when we read compound nouns, we have to start with the last word and work backwards.

Examples:

*An **address bus** is a bus dedicated to address information.*
*The **memory capacity** of a computer is the capacity of its memory.*

A large number of possible meanings can be expressed by compound nouns. For instance, the first noun or group of nouns can tell us what the second noun is made of, what it is for, or what it is part of.

1 **Material:** the first noun tells us what the second consists of.

Examples:

a silicon chip (a chip made of silicon)
a ferrite ring (a ring made of ferrite)

2 **Function:** the first noun tells us what the second noun is for.

Examples:

an address bus (a bus dedicated to address information)
an input device (a device for inputting)
an arithmetic unit (a unit which performs arithmetic functions)

3 **Part:** the second noun refers to a part of the first noun.

Examples:

a computer keyboard (the keyboard of a computer)
a monitor screen (the screen of a monitor)
a program feature (a feature of a program)

4 **Activity or person:** the second noun refers to an activity or person related to the first noun

Examples:

computer programming (the programming of computers)
a computer programmer (a person who programs computers)

systems analysis (the analysis of organizational systems)
a systems analyst (a person who analyses organizational systems)

5 **Multiple nouns:** sometimes a compound noun will join together with one or more other nouns to give an expression that has three or four words. In such cases, it is important to examine the expression very carefully to break it into its constituent parts. The secret, as always, is to read the expression from the back towards the front

Example.

4 3 2 1
a document-image-processing program (a program which processes images of documents)

Note: some expressions are written separately, while others are joined by hyphens. There are no clear rules for this. Sometimes you will see the same expression written in different ways in different texts.

Example:

document-image-processing program
document image-processing program
document image processing program

However, it is important to be consistent within a single text.

Exercise 1

A device that scans bar codes is called a *bar code scanner*.
What name is given to:

1 a unit that gives a visual display of information on a screen?
2 a device that reads magnetic cards?
3 a device that plots graphs?
4 a device that prints using a laser as the light source?
5 a unit that holds magnetic disks?
6 a device that prints using a jet of ink?
7 the rate of transmission of data?
8 a package for making presentations using multimedia?
9 a program which processes data in batches?
10 the process for the conversion of disks for computers?

Exercise 2

Using the explanations in Exercise 1 as models, write short simple explanations of the following items:

1 an input device
2 an optical character reader
3 a graphics stylus
4 a document sorter

5 a fibre optics transmission system
6 a sequence control register
7 a liquid crystal display
8 network configuration information
9 a desktop document manager
10 a multimedia editing software package



Virtual reality

Start-up

Task 1

Virtual reality is still seen as a toy by most people. Can you think of any potential applications of VR other than in computer games? Make a list

Reading

Task 2

[illegible]

Fancy a fantasy spaceflight?

Make a wish and you can go anywhere. That is the reality for a new computer invention, Chris Partridge says.

Computers are about to take people to places they have never been able to visit before including the surface of other planets. Such a trip will be an illusion, but one that comes closer to real life than anything on stage or screen. Artificial worlds are being built up in a computer memory so that people can walk through at will, look around, and even touch objects.

The system is called virtual reality so called from the mathematical concept of an image that has the virtues of a real object without the substance.

Virtual reality systems are being developed throughout the world for a range of uses including enabling people to walk 'inside' nuclear power stations while controlling a robot that actually goes into an area in which no human could live, and conducting architects through a computer-generated building before it is constructed.

British scientists have a world lead in virtual reality despite the fortunes being poured into research by Japanese and American companies, which see it as a technology for the next century.

In Britain, Robert Stone, of the National Advanced Robotics Research Centre at Manchester University, is developing systems that could put men on Mars without shooting them into space and could plunge divers under the North Sea without taking them out of the office.

The problem with guiding a robot by looking at a picture from a video camera mounted on it and twiddling the controls is that it is not a natural system, Mr Stone says. The operator spends all his time controlling the robot and none solving the problem. The time lag between seeing the image and sending a corrective control signal is another difficulty.

A virtual reality system consists of a helmet with a colour display in front of each eye, and wide-angle lenses to cover the entire field of view and give a stereoscopic effect. The helmet contains sensors, rather like electronic compasses, to record where it is pointing. A computer calculates what the wearer should be seeing in that direction and displays it on the screen.

In more advanced systems, the operator wears an electronic glove that detects exactly what the fingers are doing and transmits the information to the computer. If the user tries to pick up something the computer will make the object follow the hand to give the illusion of carrying it.

Pads in the latest type of gloves press into the insides of the fingers and palm when an object is encountered, to create the illusion of feeling it. Complete 'exoskeletons' covering the user and allowing the computer to simulate almost anything possible in real life are still in the laboratory.

A fire-fighter in a nuclear power plant, for example, would move through a computer model wearing an exoskeleton, while a robot would move through the real thing. The computer program will be derived from the data used to design the plant in the first place.

Mr Stone has developed a data glove with air pockets that are inflated to give a sensation of touch in collaboration with Airmuscle, the supplier of the pneumatic systems that made the *Spitting Image* puppets really spit.

The biggest initial market is likely to be for a new generation of video games. W Industries, of Leicester, recently launched a virtual reality system for video arcades. The system, called Virtuality, consists of a cockpit in which a player sits, wearing the helmet, at a set of controls that can mimic a bobsleigh, a spaceship, or whatever the imagination of the games programmer can devise.

The helmet has a pair of liquid-crystal displays with wide-angle lenses giving a stereoscopic image, and a set of magnetic sensors to tell the computer what the helmet is looking at as it moves.

The first game is a fighter simulation. Another is based on a sequence in the film, *Return of the Jedi*, in which flying motorcycles race through a forest. The computer can link and control several helmets at once for a group game.

Vocabulary

time lag (l. 52) – time delay

Spitting Image (l. 103) – satirical British TV programme, using computer-controlled animated puppets

bobsleigh (l. 114) – large vehicle, moving on strips of wood, for travelling fast over ice and snow

Task 3

Answer the following questions about the text:

1. Where does the term 'virtual reality' come from?
2. Which country leads the field in VR research?
3. Why are robots controlled via mounted video cameras less effective than the VR solution?
4. How does Robert Stone's system allow the user to 'feel' objects?
5. What application of VR is expected to be the commonest to start with.

Task 4

Using the line reference given, look back in the text and find the reference for the words in *italics*.

1. *one* that comes closer to real life (line 6)
2. which see *it* as a technology for the next century (line 33)
3. without taking *them* out of the office (line 43)
4. *it* is not a natural system (line 48)
5. to record where *it* is pointing (line 64)
6. and displays *it* on the screen (line 67)
7. to give the illusion of carrying *it* (line 77)
8. while a robot would move through *the real thing* (line 92)

Task 5

Using the line references given, look back in the text and find words or phrases meaning:

1. whenever and however they like (lines 10–15)
2. qualities (lines 15–20)
3. large amounts of money (lines 30–35)
4. immerse (lines 40–45)
5. twisting (lines 45–50)
6. small pockets filled with air (lines 75–80)
7. filled with air (lines 95–100)
8. released on to the market (lines 105–110)
9. imitate (lines 110–115)
10. war plane (lines 125–130)

Task 6

Choose the appropriate form of the word to fit the meaning of the sentence. Make sure you understand the different forms of the word and their meanings. Use your dictionary to find this information.

1 *correct, correctly, correction, corrective, correctness*

- a If an error occurs, it is important to take ______ action immediately.
- b The 'spell check' facility checks the ______ of your spelling.
- c The data was entered ______, so the result must be accurate.

2 *detect, detection, detectable, detective*

- a There were ______ traces of radiation in the water sample.
- b The analyst could not ______ any errors in the system.
- c She tried to escape ______ by disguising herself.

3 *sense, sensor, sensation, sensitive*

- a An infra-red ______ detects the presence of intruders in the building.
- b The probe is ______ to heat and light.
- c The new system caused a ______ when it was launched last month.

Writing

Task 7

These two paragraphs from the article contain similar information. Write one paragraph combining the information from them to give a short but complete description of the VR visual system.

> A virtual reality system consists of a helmet with a colour display in front of each eye and wide-angle lenses to cover the entire field of view and give a stereoscopic effect. The helmet contains sensors, rather like electronic compasses, to record where it is pointing. A computer calculates what the wearer should be seeing in that direction and displays it on the screen.

> The helmet has a pair of liquid-crystal displays with wide-angle lenses giving a stereoscopic image and a set of magnetic sensors to tell the computer what the helmet is looking at as it moves.

Speaking

Task 8

We asked a number of people to answer the following question:

Do you think the use of virtual reality in computer war games is going to affect young people's attitude to violence?

Here are some responses. Read them and decide which point of view (if any) most closely matches yours. Discuss your opinions.



Rita Harper

'Yes, I do. I think anything which portrays violence as fun is going to alter young people's perception of violence in a very dangerous way. Violent crime amongst young people is increasing. I think manufacturers of computer war games must take some of the responsibility.'



Susan Clark

'No, not really. Kids — particularly boys — have been playing with toy guns ever since guns were invented. Surely playing with toy guns in the real world is more dangerous than playing with imaginary guns in an imaginary world.'



Mark Watts

'It's difficult to say. Some of my friends get very aggressive when they play computer war games. But I don't really know if it makes them more violent when they're doing other things. I play a VR jet fighter game, and I don't think it has made me more violent.

Writing

Task 9

Write a paragraph giving your answer to the question asked in Task 8.

Listening

Task 10

Listen to this interview with Michael Emsley one of the exhibitors at an exhibition of virtual reality at Olympia in London. As you listen, answer these questions about the interview.

1 Why do people expect far more from VR than it can give them?
2 How does Michael Emsley think VR should be seen?
3 Give two examples of the potential applications mentioned.
4 What problems will VR developers have if the technology does not produce results, according to Emsley?
5 How does the best VR system compare with human vision?
6 Why are there three electromagnetic coils in the headset?
7 How long does it take the computer to calculate each new position of the headset and update the display?
8 In order to make a 'reasonable' visual system, how powerful would the computer have to be?

Task 11

Read this extract from the tapescript and try to fill in the gaps. The first letter of each missing word is given.

INTERVIEWER: How is the d________[1] created?

MICHAEL EMSLEY: Most VR vision systems are h________[2] that block out everything except two l________[3] c________[4] d________[5] screens, one for each eye. Using a technique learnt from a________[6] i________[7] work on vision, the images on each screen are d________[8] and displaced, giving the illusion of a t________[9] d________[10] view.

INTERVIEWER: What happens when the person moves his head?

MICHAEL EMSLEY: The movements are detected by three e________[11] coils – one coil for movements u________[12] and d________[13], one for l________[14] and r________[15], and one for movements f________[16] and b________[17]. This information is d________[18] and passed to the computer, which then u________[19] the data it holds on the position of the headset. Once the new position of the headset has been c________[20], the visual display is updated.

INTERVIEWER: It sounds like a long p________[21]

Now listen again to the cassette and check your answers.

VR input devices



Reading

Task 12

Read quickly through the text below. Does the text contradict in any way what you already know about VR systems? If so, what is the contradiction and how can it be explained?

Problems with hand-based input/output

The current hand input devices suffer from the same delays that plague the head mount display systems, but the user's over-compensation is even more noticeable. Because there is typically some interaction with the hand and other objects, absolute position control is much more important here
5 than it would be with head positioning, where relative motion is usually sufficient.

These devices are also extremely limited in their ability to generate any kind of tactile force or feedback to the user. Based on our research, even to perform gross manipulation tasks with a DataGlove is extremely difficult
10 without some kind of sensory feedback. Any kind of fine manipulation is impossible. Though tactile feedback of some kind may be possible, the quality of this will very likely be extremely low and the cost extremely high for the foreseeable future. ▶

Perhaps the major failing of the glove-based system is that it requires the
15 user to keep the hand and arm unsupported. This requires the user to employ both the agonist and antagonist muscle sets of the arm working against each other in order to perform any kind of complex task. The user actually is working harder at this than he would at pushing a real object because, in the case of a real object, at least one muscle group is at rest.
20 Further, because there is no true stable surface for the arm to rest against, any kind of control requires even more force between the muscle groups. Our experience demonstrated that a user of such a system when faced with any kind of gross manipulation tasks, could only be expected to use the system for five-minute periods with a large degree of exertion. Any
25 kind of extended activity was precluded.

As a consequence of these drawbacks, it is our expectation that the DataGlove and other similar interface devices will be replaced by more useful devices in the future. ■

Vocabulary

agonist and antagonist muscle sets (l. 16) two muscle groups which normally act in opposition to each other

Task 13

Read the text again and complete the table in note form.

	Problem of hand input device	Consequences
1		
2		
3		

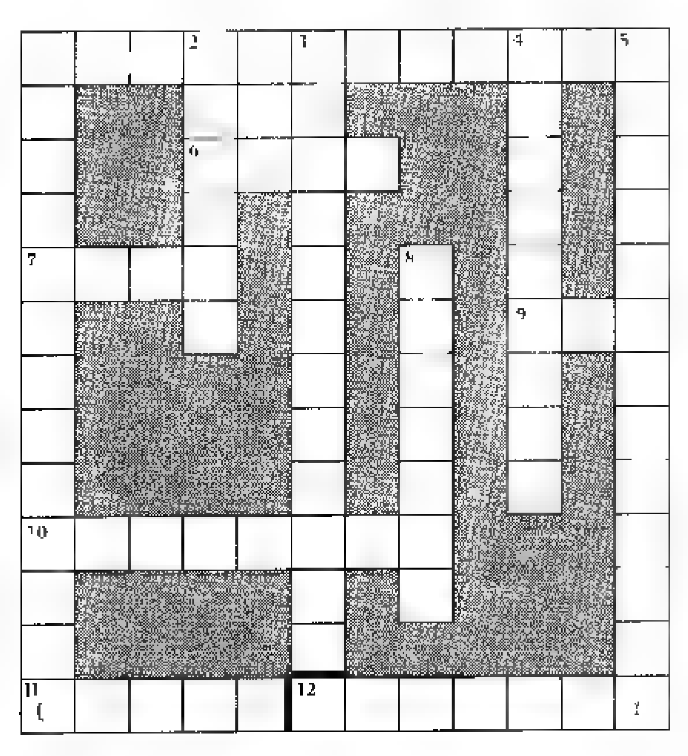
Task 14

The following pairs of words are taken from the text. In each case, say whether their meanings are similar (S) or opposite (O).

1 ☐ suffer from (l. 1) plague (l. 1)
2 ☐ absolute (l. 4) true (l. 20)
3 ☐ tactile (l. 8) sensory (l. 10)
4 ☐ force (l. 8) exertion (l. 24)
5 ☐ gross (l. 9) fine (l. 10)
6 ☐ impossible (l. 11) precluded (l. 25)
7 ☐ failing (l. 14) drawback (l. 26)
8 ☐ working (l. 18) at rest (l. 19)

Word-play

Task 15 Solve the crossword puzzle using the clues below



Across

1 The adjectival form of maths. (12)
6 A piece of glass with a curved surface used to make things appear clearer, larger, or smaller. (4
7 The opposite of gross. (4)
9 Short for 5 down. (3)
10 The study of robots. (8)
11 This is worn on the hand. (5)
12 This sort of reality is not real (7

Down

1 Making (goods) on a large scale using machinery. (13)
2 VR device worn on the head. (6)
3 Present VR hand input devices are capable only of gross ____ tasks. (12)
4 To work out or estimate. (9)
5 A kind of display. (6,7)
8 A device for finding direction, with a needle that points to magnetic north (7)

Language focus L

Classifying

The term 'classifying' means arranging objects in classes or groups according to shared characteristics. For example, the class of 'animals' includes all living things that can feel and move about, such as fish and birds. Each of these subgroups is also a class in its own right, having shared characteristics.

Classifying, then, is a process of bringing order out of confusion by organizing information in a logical fashion. There are often several ways of classifying the same information.

1 **From general to specific:** focusing on the large or high-level category and talking about its parts, that is from general to specific, the following expressions can be used.

is	is made up of
can be divided into	is composed of
is of	comprises
has	consists of

A general-to-specific classification will usually have singular main verbs, unless two or more things are being analysed simultaneously.

Examples:

1 *The CPU* ***is divided into*** *three parts: the control unit, the arithmetic-logic unit, and memory.*
2 *The CPU* ***has*** *three parts: the control unit, the arithmetic-logic unit, and memory.*
3 *The CPU* ***is made up of*** *three parts: the control unit, the arithmetic-logic unit, and memory.*
4 *The CPU* ***is composed of*** *three parts: the control unit, the arithmetic-logic unit, and memory.*
5 *The CPU* ***consists of*** *three parts: the control unit, the arithmetic-logic unit, and memory.*

2 **From specific to general:** what the smaller (or lower-level) components make when they are put together. This kind of classification uses the following expressions:

make up	may be
form	can be
constitute	are classified as

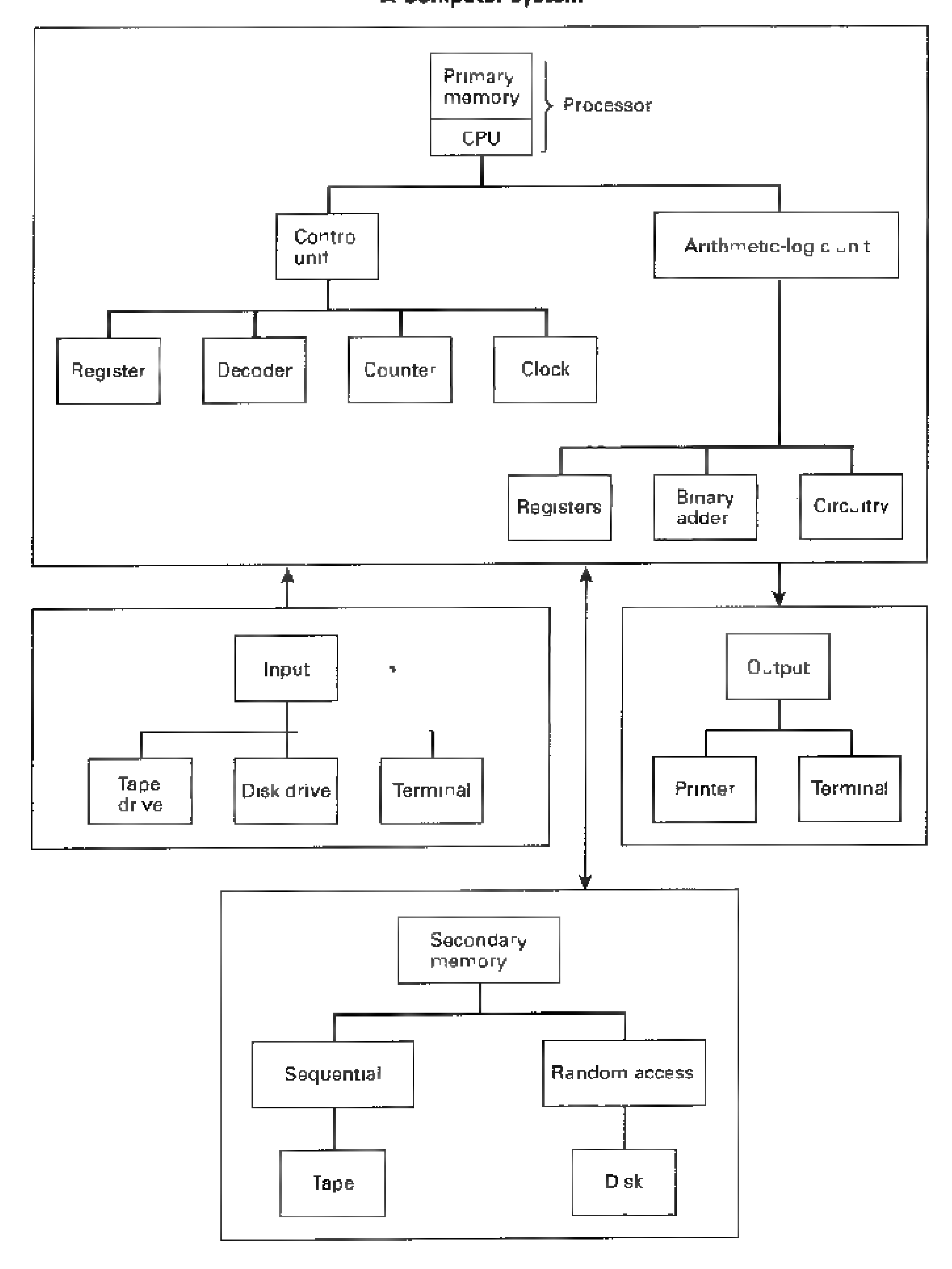
A specific-to-general classification will have plural verbs, because two or more lower-level categories are the focus of classification.

Examples:

1 *The control unit, the arithmetic-logic unit, and memory are the three parts that **make up** the CPU.*
2 *The control unit, the arithmetic-logic unit, and memory are the three parts that **form** the CPU.*

Exercise 1 Using the diagram below, complete the paragraph on the following page.

A Computer system



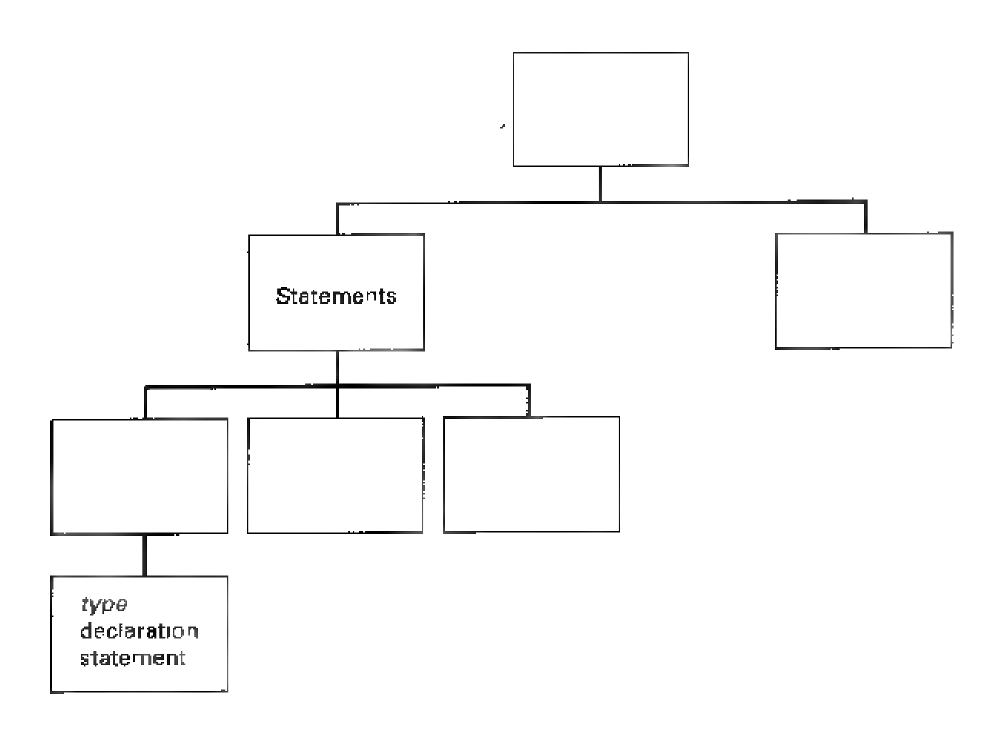
A computer has four basic components: input, processor, memory, and output. The CPU consists of two parts: the [1] ______, which directs and controls the signals and commands inside the processor, and the [2] ______ unit, which does the arithmetic operations and the decision-making operations. While the [3] ______ is made up of a [4] ______, a [5] ______, a [6] ______, and a [7] ______, the [8] ______ is composed of [9] ______, a [10] ______, and [11] ______.

In a computer, internal memory or [12] ______ refers to the storage locations inside the computer, whereas [13] ______ refers to the storage embodied in the peripherals. [14] ______ may be divided into [15] ______ ([16] ______) and [17] ______ ([18] ______). The [19] ______ devices can be either a [20] ______, a [21] ______ or a [22] ______.

These devices enter information into the computer. After the processor has operated on it, the [23] ______ devices display the results of the computations on either a [24] ______ or a [25] ______, or store them on tape or disk for future use.

Exercise 2

Refer back to the text on C language (Unit 4, page 46) and complete the diagram





Machine translation



Start-up

Task 1

Decide whether the following sentences are true (T) or false (F):

1 ☐ Some machine translation (MT) systems produce good translations.

2 ☐ It is difficult to compare different MT systems.

3 ☐ The easiest way to evaluate any machine translation of a given text is to compare it to a human translation of the same text.

Reading

Task 2

Read the text on the following page and check your answers to Task 1.

Lost in the machine translation

para

1 You can go out right now and buy a machine translation system for anything between £100 and £100,000. But how do you know if it's going to be any good? The big problem with MT systems is that they don't actually translate: they merely help translators to translate. Yes, if you get something like Metal (very expensive) or GTS (quite cheap) to work on your latest brochure, they will churn out something in French or whatever, but it will be pretty laughable stuff.

2 All machine-translated texts have to be extensively post-edited (and often pre-edited) by experienced translators. To offer a useful saving, the machine must make the time the translator spends significantly less than he or she would have taken by hand.

3 Inevitably, the MT manufacturers' glossies talk blithely of 'a 100 per cent increase in throughput', but scepticism remains. Potential users want to make their own evaluation, and that can tie up key members of the corporate language centre for months.

4 A few weeks ago, translators, system developers, academics, and others from Europe, the US, Canada, China, and Japan met for the first time in a Swiss hotel to mull over MT matters. A surprisingly large number of European governmental and corporate organizations are conducting expensive and elaborate evaluations of MT, but they may not produce 'buy or don't buy' results.

5 Take error analysis, a fancy name for counting the various types of errors the MT system produces. You might spend five months working out a suitable scoring scheme – is correct gender agreement more important than correct number? – and totting up figures for a suitably large sample of text, but what do those figures mean? If one system produces vastly more errors than another, it is obviously inferior. But suppose they produce different types of error in the same overall numbers: which type of error is worse? Some errors are bound to cost translators more effort to correct, but it requires a lot more work to find out which.

6 It isn't just users who have trouble with evaluation. Elliott Macklovitch of Canada described an evaluation of a large commercial MT system, in which he analysed the error performance of a series of software updates only to find – as the system's suspicious development manager had feared – that not only had there been no significant improvement, but the latest release was worse.

7 And bugs are still common. Using a 'test suite' of sentences designed to see linguistic weaknesses, researches in Stuttgart found that although one large system could cope happily with various complex verb-translation problems in a relative clause, it fell apart when trying to do exactly the same thing in a main clause. Developers are looking for bigger, better test suites to help to keep such bugs under control.

8 Good human translators produce good translations, all MT systems produce bad translations. But just what is a good translation? One traditional assessment technique involves a bunch of people scoring translations on various scales for intelligibility ('Does this translation into English make sense as a piece of English?'), accuracy ('Does this piece of English give the same information as the French original?'); style, and so on. However, such assessment is expensive, and designing the scales is something of a black art.

9 Properly designed and integrated MT systems really ought to enhance the translator's life, but few take this on trust. Of course, they do things differently in Japan. While Europeans are dabbling their toes and most Americans deal only in English, the Japanese have gone in at the deep end. The Tokyo area already sports two or three independent MT training schools where, as the eminent Professor Nagao casually noted in his presentation, activities are functioning with the efficiency of the Toyota production line. We're lucky they're only doing it in Japanese.

Task 3

Each of the sentences below (except one) summarizes an individual paragraph of the text. Order the sentences so that they form a summary of the text. One of the sentences contains information which is not in the text. Which one?

1 ☐ The developers of MT systems have also had problems evaluating their systems.

2 ☐ Many European organizations are evaluating MT, but the results may not be conclusive.

3 ☐ Assessing machine translations as good or bad is very difficult because such judgements cannot be made scientifically

4 ☐ It is time-consuming for potential users to test the MT manufacturers' claims that their products double productivity.

5 ☐ Better tests are needed to monitor linguistic weaknesses in MT systems

6 ☐ All machine translations need to be edited by a human translator.

7 ☐ A reliable MT system is unlikely to be available this century.

8 ☐ The price of MT systems varies greatly and none actually translates.

9 ☐ The Japanese have a few independent MT training schools, which are said to be very efficient.

10 ☐ Analysing the errors made by MT systems is inconclusive because it may only show that different systems produce similar numbers of different error types.

Task 4

Match each of the following verbs from the text with the expression that has a similar meaning:

1	churn out (para. 1)	a	add up
2	tie up (para. 3)	b	think carefully about
3	mull over (para. 4)	c	manage successfully
4	tot up (para. 5)	d	produce large amounts of
5	cope with (para. 7)	e	fail
6	fall apart (para. 7)	f	occupy the time of

Task 5

Using the paragraph reference given, find words or phrases in the text which have a similar meaning to:

1 ridiculous (para. 1)
2 colour brochures (para. 3)
3 casually (para. 3)
4 sure to (para. 5)
5 group (para. 8)
6 mysterious ability (para. 8)
7 experimenting in a small way (para. 9)
8 invested heavily (para. 9)

Speaking

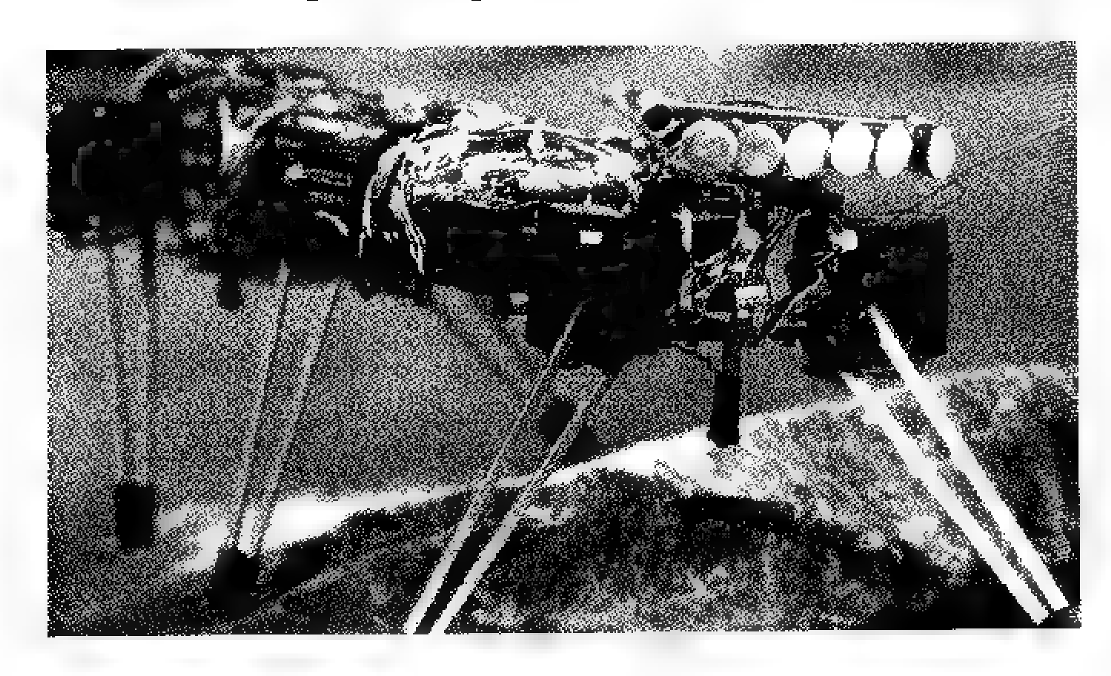
Task 6

Look at these sentences. Discuss why a machine might find them difficult to translate.

I bought a set of six chairs.	*The sun set at 9 p.m*
He set a book on the table.	*We set off for London in the morning.*
She had her hair set for the party.	*The VCR is on the television set.*

Can you think of other examples where this kind of problem occurs?

AI and expert systems



Listening

Task 7

You are going to hear a conversation in which David, a graduate student doing research in the field of artificial intelligence, explains to a friend, Kevin, what AI and expert systems are. Before you listen, try to write short definitions to explain:

1 artificial intelligence
2 expert systems

Now listen to the conversation and modify your definitions as necessary.

Task 8

Listen again to the recording and answer these questions.

1 Does visual perception require intelligence when done by humans?
2 What two categories of task are mentioned in relation to AI programs?
3 Which category of task is AI more successful at?
4 What is the relationship between AI and expert systems?
5 What examples of existing expert systems are mentioned?
6 In what way do expert systems imitate human experts?
7 Why does the Japanese system have two parallel inference engines?
8 What is the function of inference trees?

Task 9

Read this adapted extract from the tapescript and fill in the gaps with the missing words.

KEVIN: What are e________ s________[2] used for?

DAVID: They're built for commercial a________[3]. Up to now they've been used for a variety of tasks – medical d________[4] electronic fault finding, machine translation, and so on. But the point about them is that you can i________[5] them about how they came to a particular c________[6]

KEVIN: So, in that respect, they imitate human experts.

DAVID: Yes. I read recently about a Japanese system that can be used by l__________[7] to draw conclusions about new legal cases. It refers to d__________[8] of statutory laws and legal precedents and is able to see similarities in the r__________[9] processes used to decide each case exactly as a s__________[10] lawyer would.

KEVIN: How can it do that?

DAVID: The system has two reasoning mechanisms, known as i__________[11] e__________[12], which work in p__________[13]. One operates on the written laws, the other operates on the legal precedents. They draw all the possible conclusions and then output them in the form of i__________[14] t__________[15].

Now listen again to the recording and check your answers

Reading

Task 10

Read quickly through the text which follows and note down the answers to the following questions:

1. What does the expert system ROI do?
2. How did Scott French 'clone' Jacqueline Susann?
3. What other applications of AI are mentioned in the text?

One tough cookie

The software division of Mrs. Fields Cookies, Fields Software Group, has sold a version of its AI-based Retail Operations Intelligence system to fast-food giant Burger King Corp. The expert system, called ROI, assists in the management of franchised or multiple-location retail operations by creating work schedules, recommending marketing tactics and assisting in personnel hiring. Fields has been successful with this package and has started commercializing it. Now Burger King is developing its own expert system in an attempt to outperform its hamburger competitor McDonald's. Maybe it can clone Ronald McDonald's expertise.

AI waxes poetic

Cloning a well-known figure is no joke. *Just This Once* is a new novel making the rounds in the publishing world. It was written by Scott French, who claims that 10% of the novel was written by him, 25% was created by an AI program he created to imitate novelist Jacqueline Susann, and the remainder was a collaborative effort between himself and the computer. Susann, who died in 1974, wrote the definitive trash novel and one of history's all-time bestsellers – *Valley of the Dolls*.

French used Nexpert Object and took development lessons from Bechtel AI Institute to program his system with hundreds of formulas he had developed regarding Susann's essential plots and characterizations; it created a 350-page novel, which some in the literary community are ►

calling 'computerized literary ghost-writing'. While not all the reviews on his methodology are positive (50) (some think it is a violation of Susann's intellectual property), French claims, 'I don't think you can copyright the way a person thinks.' If French gets a book deal, (55) this would be the first computer-generated novel ever published. Just this once, indeed.

Hundreds of other places are employing AI, some of the (60) applications may seem mundane while others are intriguing. From expert systems that help you plan your garden to voice systems that help doctors treat (65) critically injured patients in emergency rooms to natural language front-ends for multimedia systems that feature models, actors, and actresses, AI (70) is being accepted in arenas outside those traditional realms of science and engineering. ■

Task 11 Answer these questions about the text.

1 What does the acronym ROI stand for?
2 Why is Burger King developing an expert system?
3 What kind of books did Susann write?
4 What percentage of his novel did French write jointly with his computer?
5 Has French's novel been well-received?
6 How does French justify his action?
7 Has French found a publisher for his book?
8 Where has AI traditionally been accepted?

Task 12 Choose the definition that best expresses the meaning of the word or phrase.

1 franchised (l. 8)
 a licensed to sell another company's products
 b individual
 c specially selected

2 hiring (l. 12)
 a managing
 b employing
 c training

3 outperform (l. 17)
 a do better than
 b remove from the top position
 c survive longer than

4 clone (l.19)
 a copy
 b use to one's own advantage
 c make people laugh at

5 making the rounds (l. 23)
 a circulating
 b making no progress
 c making a bad impression

6 trash (l. 34)
 a printed on cheap paper
 b popular
 c of poor quality

7 ghost-writing (l. 47)
 a writing under someone else's name
 b writing stories intended to frighten
 c writing for someone who is dead

8 mundane (l. 60)
 a ordinary
 b simple
 c world wide

Writing

Task 13

Read this summary of the first paragraph of the text on page 149, then compare it to the original.

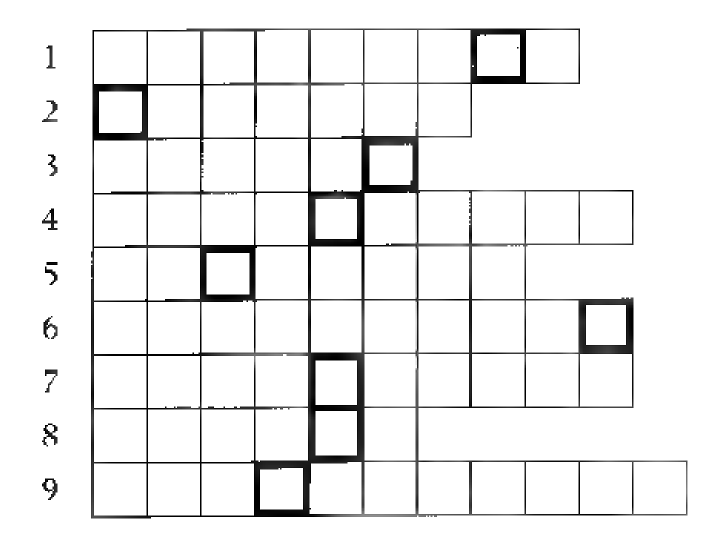
The software division of Mrs. Field's Cookies has sold a version of its AI-based system for assisting in the management of retail operations to Burger King, who are now developing their own system in an attempt to outperform McDonald's.

1. Note the information that has been omitted from the summary.
2. Look carefully at how the remaining information has been re-ordered and condensed.
3. Now complete the summary of the text, keeping it as concise as possible

Word-play

Task 14

The clues below contain anagrams of words from this unit. Enter the words in the grid, then solve the anagram in the **bold** boxes to find the hidden word.



1. Expert systems have been used in medical .... (ossadiing)
2. A set of instructions for making something. (lamurof)
3. Modernize. (dapetu)
4. A rival company. (torpetimoc)
5. Used of lines which are the same distance apart at any point. (alerlapl)
6. Assessment. (tualiaveno)
7. Having formal permission to sell another company's goods in a particular geographical area. (danrifcesh)
8. An exact copy. (ecnol)
9. Machines are still not very good at doing this. (nartgslanti)

Hidden word clue
This kind of engine is one of two reasoning mechanisms in an expert system.

Language focus M

Cause and effect

Understanding the different ways of expressing the relationship between the causes and the effects of an action is very important when you are reading English. This cause–effect relationship is commonly used in texts about computing.

Before we look at some of the ways of expressing cause and effect, note carefully this important distinction.

We can mention the cause before the effect.

Example:

(cause) (effect)
Dust often ***causes*** *the recording condition of disks to deteriorate.*

We can mention the effect before the cause.

Example:

(effect) (cause)
Deterioration in the recording condition of disks ***is*** *often* ***due to*** *dust.*

There are many different ways of expressing cause and effect.

1 **Verbs linking cause and effect:**

result	cause
produce	result in
allow	result from
prevent	bring about
enable	

Examples:

1. *The introduction of computer technology* ***brought about*** *significant changes in office routines.* (cause → effect)
2. *Computers can create artificial objects in their memories. This* ***allows*** *developers to test product design without actually creating a real prototype.* (cause → effect)
3. *The extensive use of computers in schools is* ***resulting in*** *a new generation of computer-literate students.* (cause → effect)
4. *The problems* ***were caused by*** *the volume of network traffic.** (effect ← cause)

Note: * See Language focus H for an explanation of the passive used in example 4.

2 **Connectives introducing cause:**

due to as the/a result of since because in response to as

Examples:

1 *Early computers developed quickly* ***as a result of*** *their use in military applications.* (effect ← cause)
2 *Teachers must rethink their roles* ***as*** *computer technology is creating a revolution in the classroom.* (effect ← cause)
3 ***Because*** *off-the-shelf programs do not always fit a company's needs, software often has to be specially developed.* (effect ← cause)

3 **Connectives introducing result:**

with the result that so that thus therefore consequently hence for this reason thereby

Examples:

1 *Computers can remove many of the routine and boring tasks,* ***thereby*** *leaving us with more time for interesting, creative work.* (cause → effect)
2 *Carpel tunnel syndrome is a serious medical condition.* ***For this reason,*** *computer users should be careful of their posture and take frequent breaks.* (cause → effect)
3 *When using an online database service, you must pay for the time you use.* ***Consequently,*** *you should have a good idea of what you want before you log on.* (cause → effect)

4 **Another way of showing causal relationship is by introducing the cause with *if*. Both the cause clause and the effect clause verbs are in the present tense.**

Examples:

1 ***If*** *your company has a LAN, you can share the use of a printer with your colleagues.* (cause → effect)
2 *It is easy to transport your data to another location* ***if*** *it is stored on a disk.* (effect ← cause)

Exercise 1 Read the following sentences and underline the part which expresses the *cause*.

1 Because a modem can be used for inter-computer communication, many people can now do their office work on their computer at home and transfer the files to a computer at the office

2 Many people do not explore new software because they are comfortable with what they already have.
3 When robots malfunction, it is usually due to mistakes in the programming or the design.
4 Laser printers can be quite expensive and are therefore often shared through networks.
5 Voice-recognition systems are becoming more sophisticated. Thus, keyboards may be unnecessary in the future.

Exercise 2

Read the following sentences and underline that part which expresses the *effect/result*.

1 Computers can remove many of the routine and boring tasks from our lives, thereby leaving us with more time for interesting and creative work.
2 Because there are many different types of printers, you must analyse your needs before making a purchase.
3 Since anyone can consult your files on a computer, it is a good idea to protect sensitive files with a password.
4 Fax boards are available to plug into your computer, so you do not have to buy a fax machine.
5 Computers have been reduced in both size and cost as a result of advances in design and technology.

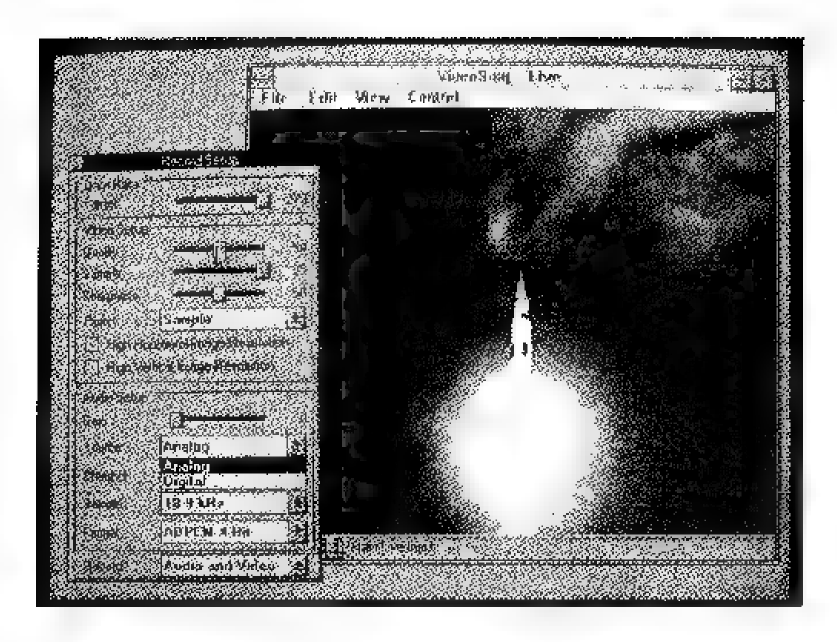
Exercise 3

The sentences below have appeared in previous units. Read them again and circle the marker showing a cause–effect relationship and underline the part of the sentence that expresses the cause. The first one has been done for you.

1 By 1980 IBM decided there was a market for 250,000 PCs, (so) they set up a special team to develop the first IBM PC. (Unit 1)
2 Because of these and so many other different judgements, there can be no absolute. (Unit 3)
3 Global communication and computer networks will become more and more a part of professional and personal lives as the price of microcomputers and network access drops. (Unit 6)
4 One of the features of a computer virus that separates it from other kinds of computer program is that it replicates itself, so that it can spread to other computers. (Unit 7)
5 ...Lehigh is waiting to infect other unsuspecting computers if you boot from one of those four infected floppies. (Unit 7)
6 As they became more proficient on the computer, some showed gains in their overall self-confidence, as well. (Unit 10)
7 Robots are better at this task, not because they are faster or cheaper than humans, but because they work in a place where humans cannot. (Unit 11)
8 This automatic accuracy is particularly valuable in this kind of industry because locating and fixing mistakes is costly. (Unit 11)
9 Artificial worlds are being built up in a computer memory so that people can walk through at will, look around, and even touch objects. (Unit 12)



Multimedia



Start-up

Task 1

Discuss these questions

1 Can you think of any actual or potential applications of multimedia in industry?
2 Do you think multimedia systems will ever become as popular as conventional audio-visual systems?

Listening

Task 2

You are going to hear Nathan Ward, a multimedia applications developer, answering questions on various aspects of multimedia. Before you listen, try to predict the answers to these questions:

1 Why is multimedia similar to graphics?
2 How does Nathan Ward define multimedia?
3 Which types of data are involved?
4 Is it easy to adapt most PCs for multimedia applications?
5 What does the term 'full motion video' refer to?
6 Are there industry standards for multimedia?
7 What is the best platform for multimedia, according to Ward?
8 What is the most popular application of multimedia?

Now listen to the recording and check your guesses.

Task 3 Listen again to the conversation and complete the table below.

Hardware requirements for multimedia

1 ______
2 ______
3 ______
4 ______
5 ______
6 ______

Task 4 Read this extract from the tapescript and try to fill in the gaps. The first letter of each missing word is given.

NATHAN WARD: 'Full-motion video' refers to the impression the v______[1] has that he or she is watching f______[2]-______[3] television. The idea is to c______[4] full-motion video in r______[5] t______[6] and digitize and c______[7] the information so that the system can treat it like any other digital data s______[8]. Some systems do it better than others.

INTERVIEWER: I see. Getting back to n______[9] requirements, apart from the e______[10] cards that you mentioned, is there anything else that is needed?

NATHAN WARD: Yes. The machine must have i______[11] for a variety of input and output d______[12].

INTERVIEWER: Such as?

NATHAN WARD: Such as a CD-ROM d______[13], VCR, d______[14] a______[15] tape ...

INTERVIEWER: Isn't there a problem of c______[16]?

NATHAN WARD: There is, but that situation is changing. Microsoft's b______[17]-l______[18] MPC specification has some support, but it's only a start. The lack of s______[19] is the main reason that multimedia is not bigger than it is. Once these are in place, users will have easy p______[20]-and-p______[21] compatibility, and developers will be able to develop a______[22] that can run on a variety of p______[23].

Now listen again to the cassette and check your answers

Reading

Task 5

Read these sentences and decide which one best summarizes the text which follows.

1 Computers cannot yet match the technological achievements of conventional audio-visual systems.

2 Although multimedia computer systems are improving very fast, they do not yet reflect the multimedia world we already live in.

3 Multimedia computer technology will soon be widely used in business, in industry, and in the home.

A JET AIRCRAFT technician peers into the bowels of a malfunctioning engine searching for the source of the problem. Finally, he spots it. Buried deep within the engine is the troublesome part. He will have to replace it. A complicated procedure, to say the least.

The technician goes to his high-powered workstation attached to a network and calls up the information on the part and the replacement procedure. An image of the part seated in the engine appears. In another window, an instructor demonstrates the repair procedure in full-motion video while the technician listens through the audio channel as the instructor explains the process. Diagrams pop up to further clarify key points. In a text window, he reviews lists of necessary parts and tools he will need to complete the repair.

Still confused about an irregularity in this situation, the technician presses the help key and a real-time image of a live supervisor pops up in another window. Using the attached microphone, the technician discusses the particular problem with the supervisor, who directs more information onto the technician's screen. The technician points a video camera at the part in question to show the supervisor the specific situation.

Welcome to the world of high-end multimedia. The situation described above is not quite here yet, but most of the pieces already exist to make this scenario become a reality using a networked RS/6000 or other high-powered workstation.

Or take this example of a scenario that is more likely today. A manager creates a detailed business presentation involving text, graphics, digitized photographic still images, and tables of spreadsheet data all combined in a single compound document. Before sending the document across the network to a colleague, the manager picks up the microphone and attaches an audio note to one of the tables, reminding the colleague about something unusual or potentially confusing in the accompanying figures.

Using a networked RS/6000 equipped with the necessary audio boards and Bolt Baranek & Newman's (Cambridge, Mass.) BBN/Slate, a compound document, office automation application, this scenario is possible today. High-end multimedia is only in its infancy, but it is here. And over the next few years, industry observers expect multimedia development to accelerate as current barriers are overcome.

Multimedia is not a new phenomenon, although it is new to business computing. We live in a multimedia world. At home, we experience a variety of media through our television, full-motion video, still images, graphics, sound, and animation. ▶

At school, we learn through systematic exposure to different media: the instructor's words text, audio tapes graphics, and a variety of visuals and video.

Computers, however, have tended to be uni-medium. Traditionally, computers were text-based and this continues to be the primary format for business information. A few systems have provided sound or graphics but until recently, the efforts were rudimentary compared to the seamlessly integrated, high quality visuals, video and audio we experience every evening at home. ■

Vocabulary

peers into the bowels of (l 1) looks down into

Task 6

Decide whether the following statements are true (T) or false (F) in relation to the information in the text. If you think a statement is false, change it to make it true

1. ☐ The jet aircraft technician first locates the faulty part and makes a mark on it.
2. ☐ The technician calls up his supervisor from his workstation to get information about the faulty part and the replacement procedure.
3. ☐ The technician can display a computer-generated graphical representation of a supervisor on his screen.
4. ☐ This kind of repair procedure could well be possible before long.
5. ☐ You can already buy multimedia business presentation applications.
6. ☐ Industrial experts expect multimedia development to get faster and faster.
7. ☐ Multimedia existed long before the invention of the computer
8. ☐ In terms of quality multimedia computer systems have only recently become comparable with the media we already use.

Task 7

Using the line references given, find the words in the text which mean:

1. catches sight of (lines 1–5)
2. order of doing things (lines 5–10)
3. instruments (lines 20–25)
4. appears (lines 30–35)
5. top quality (lines 40–45)
6. made up of two or more parts (lines 55–60)
7. early stages of development (lines 70–75)
8. obstacles (lines 75–80)
9. undeveloped (lines 95–100)
10. smoothly (lines 100–104)

Speaking

Task 8

Work in pairs using the information in the advertisement below

Student A: You are interested in upgrading your PC to use multimedia. Describe your machine to the salesperson and ask about the various options available, prices, etc.

PC specifications
386 25MHz
4 MB RAM
105MB hard disk
VGA colour monitor
3 expansion slots

Student B: You work for a company that sells hardware and software. Find out what your customer wants and check that his/her PC can be upgraded, by referring back to the list you made in Task 3. Explain the options that are available and try to persuade the customer to buy one of the products advertised.



ITERATIVE IMAGING LTD

Low cost hardware and software is now available to transform your Personal Computer into a MultiMedia workshop.

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CREATIVE LABS MULTI-MEDIA UPGRADE KIT includes the Sound Blaster Pro stereo card MIDI Kit a high performance CD-ROM drive, Microsoft Windows® version 3.0 graphical environment with Multimedia extensions 1.0, Sound Blaster Pro software and additional CD-ROM titles.

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[illegible]

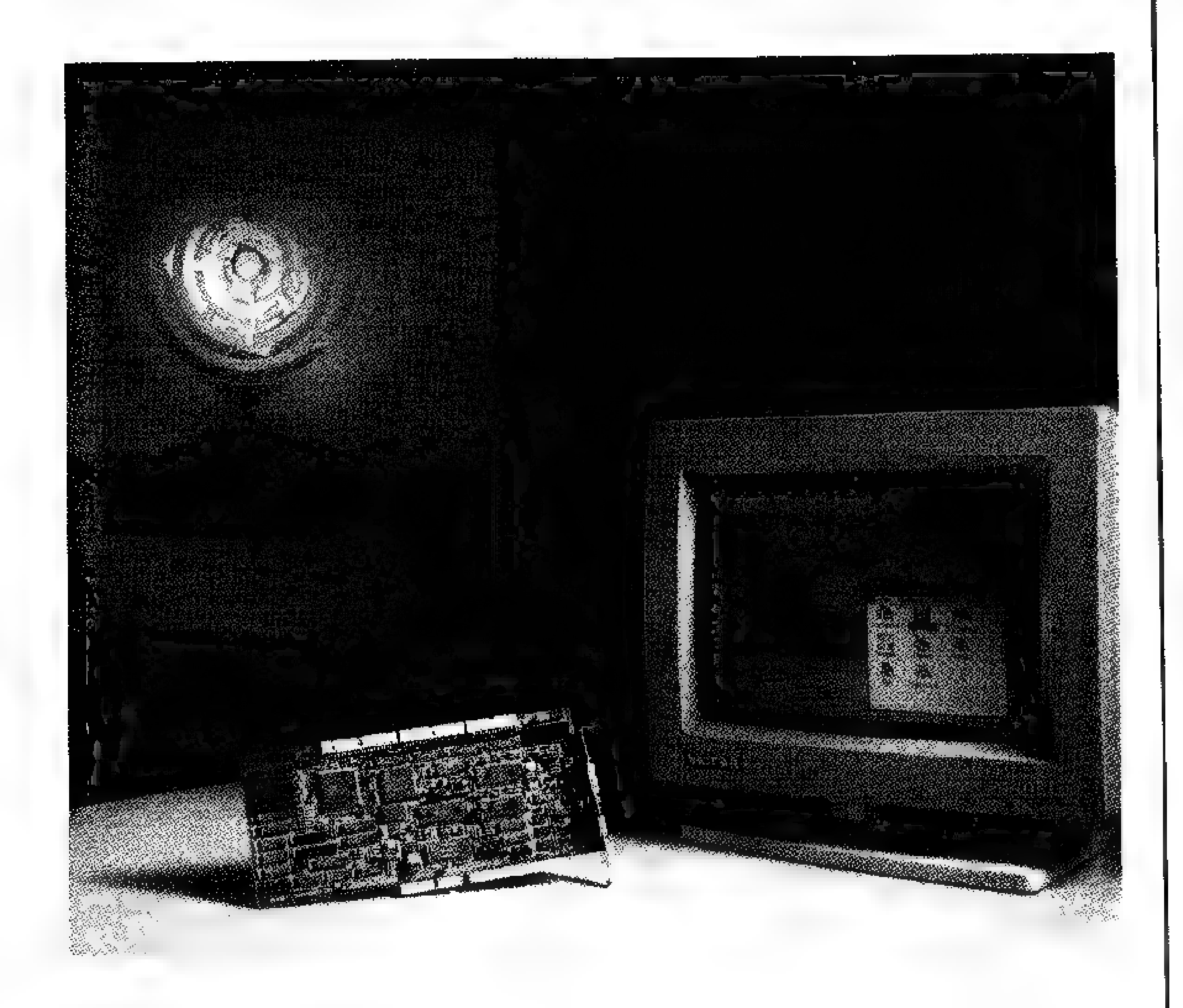


Writing

Task 9

Work in pairs. You manage a company specializing in multimedia hardware and software. Prepare a leaflet to inform companies of the potential benefits of using multimedia. Invite them to contact you for a free consultation.

Computer-to-video conversion



Reading

Task 10

Read the text opposite and answer these questions.

1 What are the main differences in the way images are produced on a TV screen and on a computer screen?
2 Why did the developers of the PAL system invent interlaced video? What are its advantages and disadvantages?
3 Which of the two suggested ways of getting a signal from a computer to record on a VCR do you think is preferable? Why?

How they work

Although the computer screen has the standard characteristics of a TV display, images are produced in a very different way. If you want to record anything from your computer to video for play back on a TV monitor, you need a print-to-tape device.

In a TV display, a tight beam of electrons scans the screen in much the same way you read a page of text from the upper-left corner, it moves line by line to the lower right. Usually, one pass writes the entire image once. The number of passes the beam writes per second is called the vertical refresh rate and is measured in kiloHertz. Most computer systems follow the American TV standard and use a vertical refresh rate of 60kHz whereas PAL, the European TV standard, requires 50kHz.

Another difference is with bandwidth. When PAL was defined, the bandwidth available for a TV signal was very narrow. While the TV image had to be refreshed at least 50 times a second for flicker to remain unnoticeable, there was not enough bandwidth to transmit all 625 lines of one TV image in a fiftieth of a second. The developers of PAL, therefore, employed a clever trick called interlaced video. They split each frame of the image into two fields of 312.5 lines, the odd lines into field A, the even ones into field B. The fields are transmitted at a rate of 50 per second, leaving us with an effective frame rate of 25 per second while eliminating most of the flicker.

This is fine for viewing from several yards, but should you move as close to your TV as you would to your computer screen you'd end up with a headache after half an hour. Also, if any parts of the displayed image occupy only one horizontal scan line, that scan line will flicker quite noticeably at 25kHz.

All video equipment works with PAL-standard, 50kHz interlaced video. Computers tend to use 60kHz (or more), non-interlaced video and look more stable. To get a signal from your computer to record on a VCR, there are two possibilities:

1. Use a display adaptor that can produce PAL-standard video. You would not be able to connect such a card to a standard computer monitor, however. A video monitor or a multi-sync monitor is needed. You wouldn't want to look at such a screen for hours on end – interlaced video is not suitable for word processing.
2. Put up with the standard display signal from your computer (probably 60kHz) and use a scan converter. It can take a video signal with one refresh or scan rate, and convert it to the other. A scan converter is actually a small digital frame-grabber with asynchronous video output.

▶ **Vocabulary**

yard (l. 45) measure of length (1 yard = 0.914m)

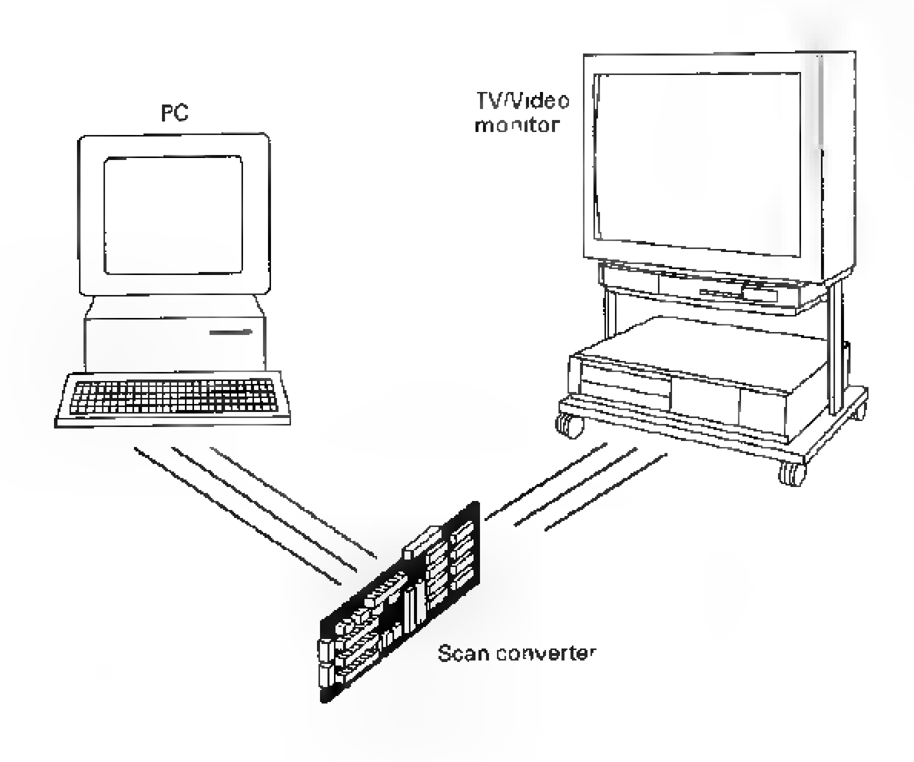
Task 11

Match the sentence halves to form complete sentences.

1	If you want to play back anything from your computer on a TV monitor,	a	it will have a vertical refresh rate of 60kHz.
2	If your computer system follows the American TV standard,	b	you must use a scan converter.
3	If you use a monitor with interlaced video for word processing,	c	you need a print-to-tape device.
4	If you use a display adaptor that can produce PAL-standard video,	d	you cannot use a standard computer monitor, but must use a video or multi-sync monitor instead.
5	If you want to use the standard display signal from your computer,	e	you will get a headache!

Task 12

Which of the two configurations for computer-to-video conversion suggested in the text does this diagram show?



Word-play

Task 13

Find the hidden words in this square Some appear vertically, some horizontally and some diagonally They may be upside-down or back to front. Use the clues on the opposite page to help you. The number of letters in each word and the first letter of the word appear in brackets after the clue.

N	O	N	E	M	O	N	E	H	P	E
E	A	D	A	P	T	O	R	E	M	S
N	T	R	O	U	B	E	S	O	I	L
O	A	C	C	E	P	T	E	P	R	O
H	E	S	P	A	N	D	E	T	A	T
P	E	C	I	F	I	R	C	A	T	I
O	M	R	F	E	V	O	B	N	U	O
R	A	F	L	I	C	K	E	R	O	N
C	L	F	S	C	A	N	T	R	I	S
I	C	O	M	P	O	U	N	D	N	G
M	R	N	O	I	T	A	M	I	N	A

Find words which mean:

1. A strange thing or event. (10, P)
2. An instrument that changes soundwaves into electrical current. (10, M)
3. A display ______ is one device used in computer-to-video conversion. (7, A)
4. Mend. (6, R)
5. A person who monitors the way people work to check that things are done properly. (10, S)
6. An opening on a computer into which fits an expansion board. (4, S)
7. To shine unsteadily. (7, F)
8. A ______ document is made up of two or more documents combined together. (8, C)
9. A ______ converter is another device used in computer-to-video conversion. (4, S)
10. The technique whereby still drawings are given the appearance of movement. (9, A)

Language focus N

Making predictions

A prediction is a statement about a particular subject in which we say what we think will happen in the future. Predictions are not always absolute, but can be expressed with different levels of certainty, according to the context in which they are made.

1 **Certainty can be expressed by:**

will (definitely, certainly)
certain, sure
without a doubt, without question

2 **Probability can be expressed by:**

probable, probably, likely
most/highly probable, most probably
most/highly likely

3 **Possibility can be expressed by:**

may (not), might (not), can, could
possible, possibly, perhaps

4 **Improbability can be expressed by:**

improbable, unlikely
doubtful, questionable
probably not
most/highly improbable/unlikely
most/highly doubtful/questionable
most probably not

5 **Impossibility can be expressed by:**

present or future	*past*
cannot, could not	could not
not possible, impossible	not possible, impossible

These expressions are used in sentences in different ways:

Examples:

1. *Notebook computers* ***will definitely*** *be cheaper next year.*
2. ***It is (highly) probable/likely that*** *notebook computers will be cheaper next year.*
3. *Notebook computers* ***may/might*** *be cheaper next year.*
4. ***Perhaps*** *notebook computers* ***will*** *be cheaper next year.*
5. ***It is unlikely/doubtful that*** *notebook computers will be cheaper next year.*
6. *Notebook computers* ***will most probably not*** *be cheaper next year.*
7. *Notebook computers* ***will definitely not*** *be cheaper next year.*
8. ***It is impossible that*** *notebook computers will be cheaper next year.*

Sometimes, predictions are made subject to certain conditions. In such cases, sentences typically have two parts: the *if-clause* and the *main clause*.

Examples:

1. ***If*** *the price of notebooks fall next year, I will buy one.*
2. ***If*** *the system crashes, we will lose all our latest data.*

When the *if-clause* comes second, there is no comma between the two clauses.

Examples:

1. *I will buy a notebook* ***if*** *the price of notebooks fall next year.*
2. *We will lose all our latest data* ***if*** *the system crashes.*

As with the simple predictions listed above, it is possible to express different levels of certainty about the likelihood of the condition (in the *if-clause*) by changing the tense of the verbs from the future and present forms to the more 'remote' past and conditional forms.

Examples:

1. *If the price of notebooks falls next year, I will buy one.* (The speaker thinks it is possible that the price of notebooks will fall next year and, if it does, he will buy one.)
2. *If the price of notebooks fell next year, I would buy one.* (The speaker thinks it is unlikely that the price of notebooks will fall next year but, if it does, he will buy one.)
3. *If the system crashes, we will lose all our latest data.* (The speaker thinks it is possible that the system will crash and, if it does, we will lose all our data.)
4. *If the system crashed, we would lose all our latest data.* (The speaker thinks it is unlikely that the system will crash but, if it did, we would lose all our data.)

The first form, as in sentences 1 and 3 – [(*If* + present) + *will*] – is known as the first conditional. The second form, as in sentences 2 and 4 – [(*If* + past) + *would*] – is known as the second conditional.

Exercise 1 Match the if-clauses (1 to 6) to the main clauses (a to f) to make complete sentences.

1	If you never read computer magazines...	a	...you would be able to access our bulletin board.
2	If you never back up your hard disk...	b	...it is unlikely that you will have a problem with computer viruses.
3	If you had a modem...	c	...we would have a bigger range of typefaces and fonts to choose from.
4	If you don't copy pirated software...	d	...you will miss important new products.
5	If I knew more programming languages	e	... I would get a better job.
6	If we bought a better printer...	f	... you will probably lose some important files.

Exercise 2 Complete the sentences with the words below. Are the sentences first (F) or second (S) conditionals?

1 ☐ If you ______ your VDU in direct sunlight, it ______ damaged.

2 ☐ If you ______ your screen for too long, you ______ a headache.

3 ☐ If you ______ to link your PCs with a mainframe, you ______ to install a network

4 ☐ If the market for portable computers ______, prices ______ even more next year.

5 ☐ If we ______ a fax machine and e-mail facility, we ______ so many letters each day.

would not post	leave
grows	will get
will be	would need
wanted	will be reduced
look at	installed

Now make up three first conditional and three second conditional sentences of your own.



Computer graphics

Start-up

Task 1

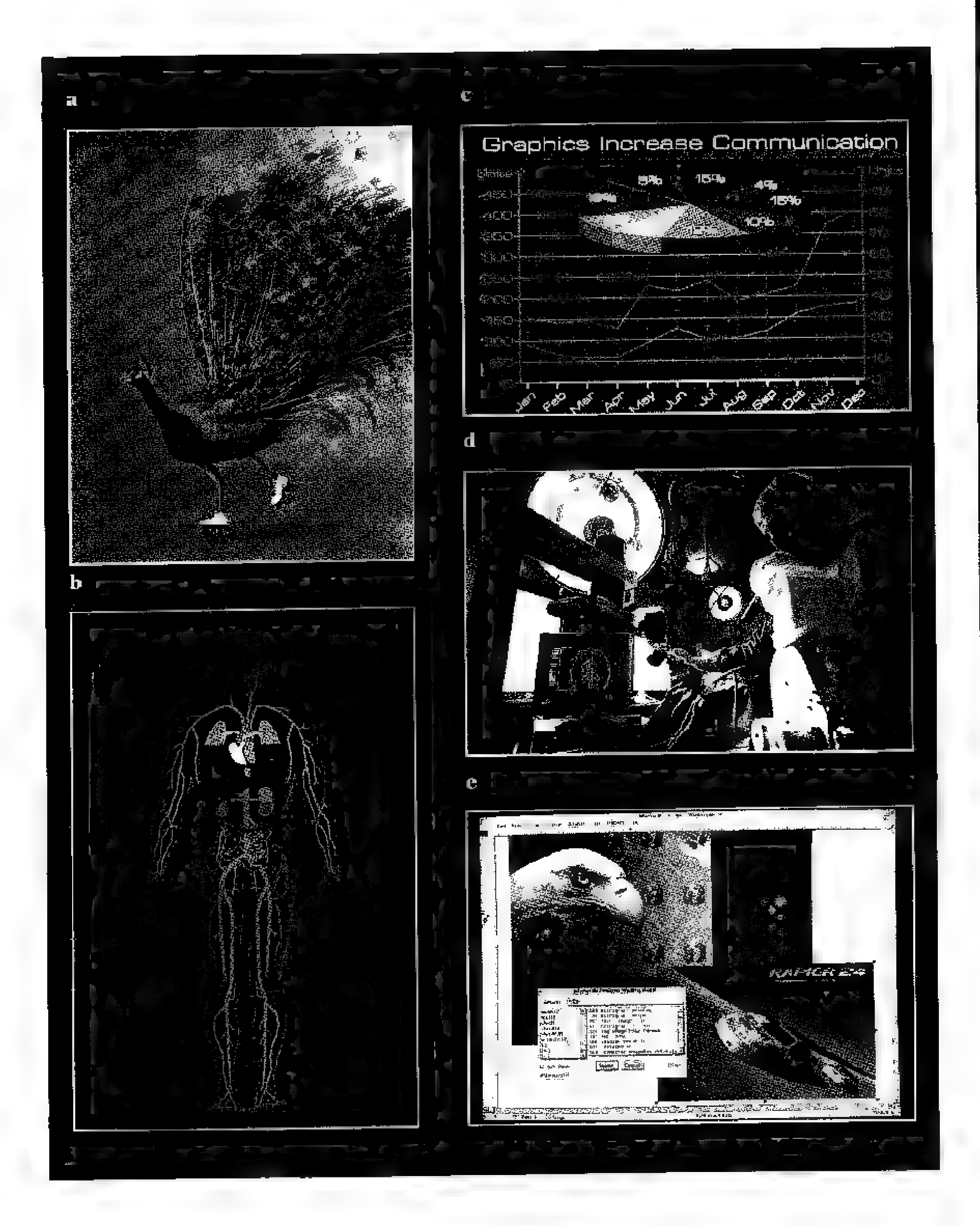
Work in pairs. Look at the photograph below and discuss these questions.

1 What do you think the photograph was used for?
2 How was the image achieved?

Listening

Task 2 Listen to these descriptions of the images below. Match each description with the appropriate image.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐



Reading

Task 3

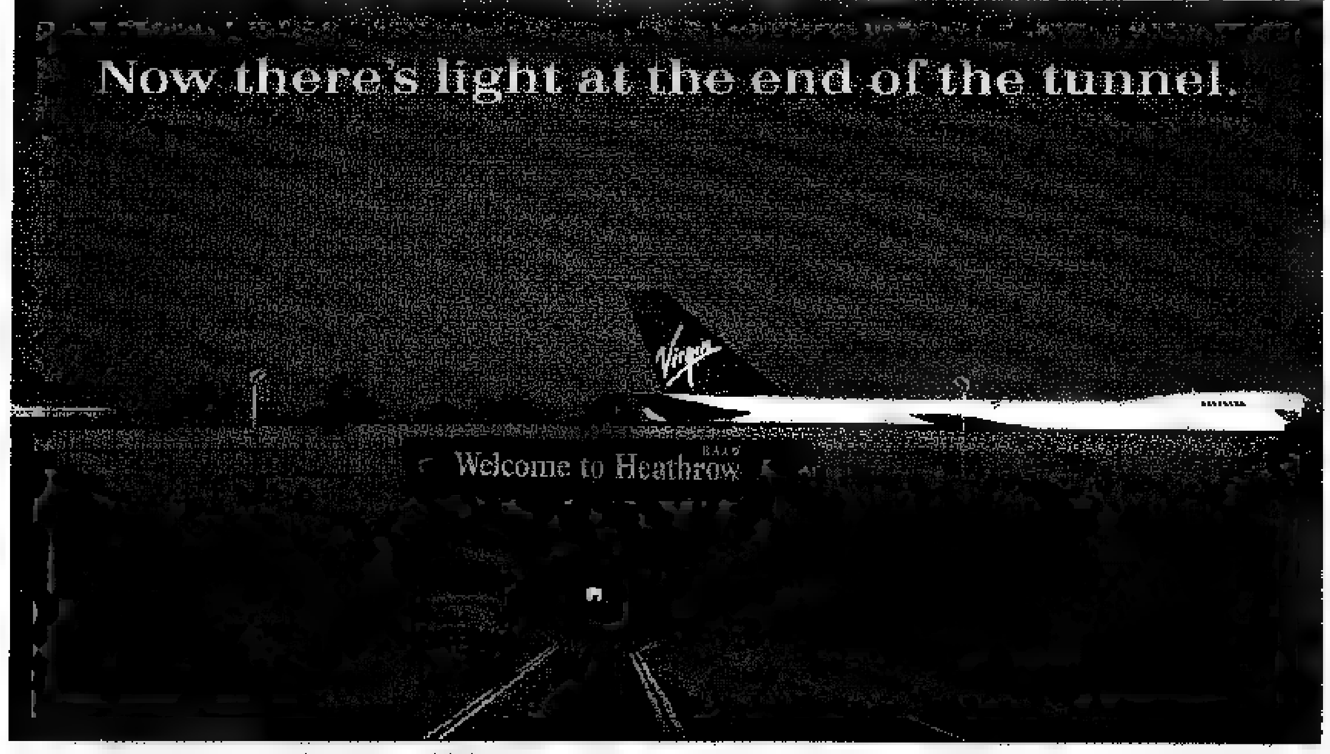
Match each of the following words with the appropriate definition:

1	capture	a	light-sensitive substance on the surface of film
2	poster	b	device that uses compressed air to spray paint
3	retouch	c	succeed in representing on film
4	airbrush	d	alter by making minor changes
5	emulsion	e	large printed picture used for advertising purposes

Task 4

Compare the two photographs below

1 How many differences can you find?
2 Why do you think the changes were made?



TERMINAL 3 TO NEW YORK, TOKYO AND LOS ANGELES.





Now read the text and compare your answers.

Tunnel vision

You're at Heathrow but your plane is at Gatwick. This was just one of the problems facing the agency producing this ad

Capturing this image was never going to be easy, not least because Virgin Atlantic wasn't flying out of Heathrow when this poster and press campaign was being put together during May and June. Also, while the road tunnel does indeed pass under one of the Heathrow runways, a plane would never appear this big from the photographer's standpoint (or if it did, it would be taxiing along the A4 Bath Road, which in real life runs just above the tunnel mouth). Another inherent difficulty was that you can't really see any light at the end of the tunnel because the road dips in the middle.

From the outset, therefore, Moira Caskin O'Malley of London ad agency Woollams knew some kind of electronic jiggery pokery would be necessary, and for this art director John Jessup turned to conventional retouching house Acorn Studios, which offers use of Apex Graphics' electronic Dalim Litho colour design system as part of its service.

The ad, which launches the new Virgin Atlantic flights from Heathrow, is made up of two shots taken by photographer Max Forsythe: one of the jumbo taken at Gatwick, and another of the Heathrow tunnel taken on a typical day (which must rank as every photographer's most unfavourable location).

Considerable retouching took place to create just the right scene. The vehicles coming out of the tunnel were removed, and on the opposite side the white cars and the traffic in the tunnel were extracted, while the taxi cab and the estate car were added.

The Toshiba ad was replaced with a *Welcome to Heathrow* poster, and the ad on the right and the neighbouring steps were conveniently taken out. The bush on the left, which seems out of character with the rest of the resident shrubbery, was considered too spiky and was therefore redrawn.

With the airliner in position, the streetlights needed to be extended, and highlights were also added to them. Given the presence of the light on the right, a shadow had to be appropriately positioned on the jumbo.

To create that elusive patch of light at the end of the tunnel (which was crucial to copywriter Paul Quarry's words), Acorn used the Dalim's electronic airbrush facilities.

The lorry disappearing into the patch of light was painted conventionally onto the final output transparency by retoucher John Stammers, who is also managing director of Acorn. Stammers put this addition on to the base side of the film so it could be easily washed away if the art director didn't like it (conventional retouching is normally done on the emulsion side). It also meant that no time or money was wasted going back to the system.

► Vocabulary

Heathrow (l. 1) Gatwick (l. 2) – London's main airports
taxiing (l. 15) – moving slowly along the runway before take-off or after landing
jiggery pokery (l. 25) – trickery
bush (l. 53) – thickly-growing plant
shrubbery (l. 56) – area planted with bushes

Task 5

Use the table below to note down the steps taken to produce the final poster and the reason for each alteration.

Alteration	Reason

Task 6

These are answers to questions about the text. Write the questions.

1 During May and June
2 Woollams' Moira Gaskin O'Malley
3 Apex Graphics.
4 To launch the new Virgin Atlantic flights from Heathrow
5 No, the shot of the tunnel was taken at Heathrow but the shot of the jumbo was taken at Gatwick.
6 To create just the right scene.
7 *A Welcome to Heathrow* poster
8 Because it fitted in with the chosen slogan: 'Now there's light at the end of the tunnel'.

Task 7

Using the line references given, look back in the text and find words that have a similar meaning to:

1 built-in (lines 15–20)
2 goes down and then up again (lines 20–25)
3 traditional (lines 25–30)
4 be rated (lines 35–40)
5 nearby (lines 50–55)
6 dark patch (lines 60–65)
7 difficult to represent (lines 65–70)
8 used unnecessarily (lines 80–85)

24-bit colour

Reading

Task 8

Before you read the text, try to answer these questions.

1 How many distinct shades of colour can the human eye see?
2 What is:
  a a pixel?
  b a bit?
  c a byte?
  d a greyscale display?
3 Roughly how many different colour shades can be generated from 24-bit colour?
4 If your machine has 24-bit colour and a one million pixel display, how much memory will you need to drive the screen?

Now read the text and check your answers.

Baffled by computer-speak? Take Buzz, the instant remedy to jargon



24-bit colour

Short explanation:
If your computer has 24-bit colour, then it can display photographic images in colour on its screen that have natural-looking tones.

Long, long explanation:
In principle, there is an infinite number of shades available between a solid colour and pure white. In practice, the human eye can detect somewhere between 150–200 distinct shades, so as long as you've got more than this, you can produce an undetectably smooth progression of shades (there are exceptions but they're not worth going into here).

Cheapo computer monitors can't display shades — you get solid black or white and nothing else (in many cases you get black or green). It is possible to fake shades on one of these monitors by a sort of poor man's halftone process called dithering but this is useless for serious image viewing and retouching.

What you need is a computer that can show true shades on its screen.

A computer builds up a picture from a series of building blocks called pixels. Each pixel is a square (normally) of a single colour. The more pixels you can divide the picture into, the higher the resolution of the complete image. The computer organizes itself by describing each pixel that it wants to display as a code in the binary mathematical set (numbers built up from a series of 0s or 1s). Each 0 or 1 is called a bit.

Computers are generally structured to work in groups of eight bits (called a byte). These eight numbers can be used to count up to 256, and so can describe 256 shades of grey from black to white which is more than enough to satisfy the eye.

A computer which can assign eight bits to describe ▶

each pixel will produce perfect black and white photographs on its monitor. A monitor that can show all these shades is called a greyscale display.

Now your eye can detect those 150–200 shades in all three of the colours it can see: red, green, and blue. If you use eight bits to describe colour, you only get 256 colours, which isn't enough – you get a mildly posterized effect, although the dithering process can simulate more colours at the expense of quality.

To get the full colour photographic effect on a computer monitor, you need to be able to generate 256 shades for each colour. This takes eight bits of information per colour, giving a total of 24 bits. This is the 24-bit colour that you keep reading about in computer magazines. If you take all the possible variations of 256 shades of three colours, you end up with a possible 16.7 million colour shades.

Some computers, such as the Macintosh, offer 32-bit colour: the spare eight bits can be used to control transparent overlays of colour – you get 256 levels of transparency.

You only really need 24-bit colour if you are going to do colour photographic retouching on-screen or similar 'painting' on-screen. For linework and picture placing, an 8-bit colour monitor is perfectly adequate, as you can still define colours for print even if you can't show them on the screen.

Naturally, there's a bottom line in all this, or everyone would be using 24-bit colour. To start with, you need special circuit boards which plug into your computer and drive the monitor. An 8-bit board is cheaper than a 32-bit one.

You also need plenty of memory. A typical high resolution colour monitor can display about a million pixels. The 24 bits that your computer uses to describe each pixel can also be described as three bytes. To describe a million pixels takes three million bytes. In other words, a hefty three megabytes of your computer's memory is assigned to driving the screen. With 8-bit colour, you only need one Mb.

Generally, 24-bit colour boards include extra memory and processors to speed up the display performance.

Your opinion:
It's cheaper to be colour blind. ■

Vocabulary

detect (l. 12) – recognize
dithering (l. 29) – a process which makes the transition between shades seem smoother
retouching (l. 31) – making minor changes in a photograph
a mildly posterized effect (l. 73) – a slightly crude image
there's a bottom line (l. 108) – it is expensive
hefty (l. 126) – large

Task 11

Decide whether the following statements are true (T) or false (F) in relation to the information in the text. If you think a statement is false, change it to make it true.

1 ☐ If a computer can generate more than 200 distinct shades of colour, the human eye will see a perfectly smooth progression of shades.

2 ☐ Everybody should have a computer that can show true shades on its screen.

3 ☐ A group of eight binary numbers is called a byte.

4 ☐ Under certain circumstances, 8-bit colour can provide more than 256 colours.

5 ☐ 32-bit colour offers 256 times as many shades of colour as 24-bit colour.

6 ☐ To run 24-bit colour, you need three times as much memory to drive the screen as you do to run 8-bit colour.

Task 10

Use the information in the text to complete the dialogue *in your own words.*

A ____?

B Yes, I'd like to find out a little about 24-bit colour.

A ____?

B Well, first of all, I'd like to know what sort of quality it will give me on my monitor.

A ____

B As many as that? What add-ons do I need?

A ____

B How much memory will I need to drive the screen?

A ____?

B It's a high resolution screen.

A ____

B That's a lot! I use colour mainly for linework and picture-placing. Do you think it's worth buying 24-bit colour?

A

Writing

Task 11

Write a summary of the text. You should aim to limit your summary to about 1›0 words. Start by underlining the important ideas in the text. Try, where possible, to combine more than one idea in each sentence.

Word-play

Task 12

Solve the crossword puzzle using the clues below. The words are taken from all fifteen units.

Across

2 A device for converting digital data into a sound signal that can be transmitted by a telephone network. (8,7)
4 One kind of printer. (6)
5 and **6** An __________ is a smoothly varying electrical pulse that was the basis for all telephone communication until recently. (6,6)
6 See **5** across
7 Someone who is extremely knowledgeable about a particular subject. (6)
8 The lack of an industry ______ for operating systems means that programs have to be specifically written for each existing system. (8)
9 A million floating point instructions per second. (8)
11 A robot with some physiological structures similar to those of humans. (6)
12 To transmit a virus to a computer. (6)
13 To go into a computer file. (6)
14 Erase or omit. (6)
15 An operation performed by the control unit. (7,8)

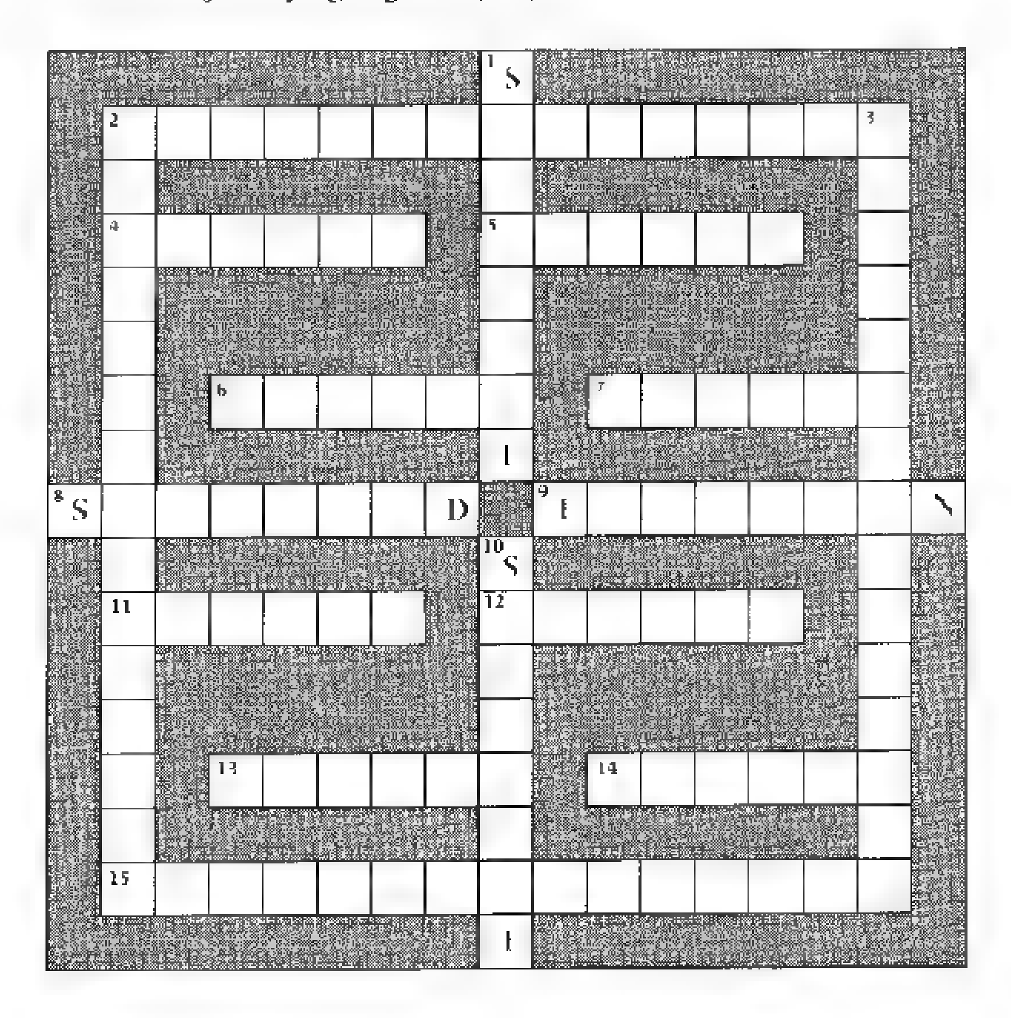
Down

1 To jumble up a string of characters so that it can be read only after decoding (8)

2 This unit forms part of the CPU. (10-5)

3 A device fitted over a computer screen to stop dangerous emissions. (9,6)

10 Another way of saying 'logs off'. (5,3)



Appendix 1
Letter writing

The aim of this section is to help students of computer science and those already working in computing related jobs to improve their letter-writing skills. All the most common types of work-related letters are covered, and special attention is given to presentation and structure.

1 Presentation and structure

The layout of business letters often varies slightly from company to company. All the letters in this appendix follow a style which is acceptable for all kinds of business letter and may safely be used as models for your future correspondence.

Task

Decide whether the following statements are true (T) or false (F). Then read the text which follows to check your answers.

1 ☐ On unheaded notepaper, you should always write your name above your address.

2 ☐ On unheaded notepaper, the address of the sender is on the right.

3 ☐ *Our ref.* refers to the writer's filing system.

4 ☐ In the UK, the date 2/4/93 means February 4th, 1993

5 ☐ You should always write the name and position of the person you are writing to above his/her company address.

6 ☐ You use the salutation *Dear Sir* or *Dear Madam* when you know that the person you are writing to is older or more senior than you.

7 ☐ If you begin with *Dear Sir*, you end with *Yours faithfully*.

8 ☐ The initials *p.p.* indicate that the person signing the letter is doing so on behalf of someone else.

9 ☐ It is unusual for the writer to put his/her company position at the end of the letter.

10 ☐ In business letters, dates should appear as numbers separated by full points (.) or obliques (/).

11 ☐ The abbreviation *Ms* can refer to both married and unmarried women.

12 ☐ If you are writing to Mrs Anne Swanson you open with *Dear Anne Swanson.*

13 ☐ Short business letters are regarded as impolite.

14 ☐ Americans may begin a business letter with the salutation *Gentlemen*, followed by a colon.

15 ☐ The letters *Enc.* mean that something else has been sent with the letter.

2 Enquiries and replies

The content of a letter of enquiry will depend on how well you know the person or company you are writing to. If you are writing to a company for the first time – whether asking for a catalogue or requesting details about a particular product or service – you should start your letter by giving information about your own company. Then state your reason for writing and make your request.

Task 1, when completed, provides a model for a letter of enquiry. Task 2, when completed, provides a model for a reply to an enquiry.

Task 1

Read the following letter. Fill in each gap with the letter corresponding to the appropriate word.

a	send	d	Project	g	attention	j	graphics
b	together	e	Madam	h	protecting	k	faithfully
c	forward	f	based	i	sell		

Physiologica

17 Princes Street
London
EC1 7DQ

Telephone 071 [illegible]
Telex [illegible]
Fax 071 [illegible] 7712

Our ref AN/JS
Your ref

1 July 19__

Discpro SA
251, rue des Ramonières
F-86256 POITIERS CÉDEX
France

For the 1____ of the Sales Manager

Dear Sir or 2

We are a software company 3____ in London and are currently developing a Windows-based scientific 4____ package for use in universities and research laboratories. We are interested in 5____ the programs we 6____ from unauthorized copying and duplication.

Could you please 7____ us more technical information about your [illegible] software protection system 8____ with your current brochure and price list?

We look 9____ to hearing from you

Yours 10

Anne Newson

Anne Newson
11____ Director

Task 2

Complete this reply to the letter of enquiry in Task 1 using the prepositions given. You will have to use some prepositions more than once

for	from	in	to
on	of	with	

251, rue des Ramonières F-86256 POITIERS CEDEX

Discpro SA

Tel (33) 99681031
Télécopie (33) 102163

Réf PV/KH

5 July 19 ___

Ms Anna Newson
Project Director
Physiologica
17 Princes Street
London EC1 7DQ
UK

Dear Ms Newson

Thank you [1] ___ your letter [2] ___ 1 July [3] ___ which you expressed an interest [4] ___ the RSP 11 software protection system. Please find enclosed our latest brochure and price list.

[5] ___ the information in your letter, I can confirm that the range of products we supply would be ideal [6] ___ your needs. In particular, I would like to draw your attention [7] ___ the RSP 11W [8] ___ page 3 which is designed for software protection in both Windows and O/S 2 environments.

As you will see, our protection systems are tailored [9] ___ individual programs. Please let me know whether you would like to arrange a meeting [10] ___ our Technical Director, Mr Michel Gérard, to prepare a more detailed report [11] ___ your program and particular requirements. He will be in London during the week beginning 15 July.

I look forward to hearing [12] ___ you.

Yours sincerely

P Varenne

P Varenne
Sales Manager

Enc.

Task 3

In each of the following sentences, choose the correct word to fill the gap.

1 I would be __________ if you could send me details of your PS 2 range.
 a thankful **b** please **c** content **d** grateful

2 You were __________ to us by our associates.
 a advised **b** suggest **c** recommended **d** informed

3 We were given your __________ by The Chamber of Commerce.
 a identity **b** company **c** name **d** placing

4 Thank you for your letter __________ 19 June.
 a in **b** on **c** of **d** from

5 Please __________ enclosed our current catalogue and price list.
 a find **b** look **c** receive **d** examine

6 We would appreciate __________ you could send us further information on your range of non-impact printers
 a it that **b** this **c** when **d** it if

7 I would be grateful if you could arrange for your Technical Director __________ on me.
 a will call **b** is calling **c** to call **d** calls

8 We look forward __________ from you
 a hear **b** to hear **c** hearing **d** to hearing

9 We would be grateful __________ an early reply
 a to **b** of **c** for **d** with

10 Should you require anything further at this time, please do not __________ to contact me.
 a void **b** hesitate **c** delay **d** prevent

Task 4

Match each section of the letter of enquiry on the following page with the appropriate gap on the blank below.

a

b

c

d

e

f

g

h

i

j

1. We are currently using 15 Procom 211 Premier PCs in our mail order department. We have been pleased with their performance, but now require machines that will run faster.
2. M H Jansen
   Publicity Manager
3. I look forward to hearing from you
4. Could you please let me know whether it is possible to upgrade the PCs to 486s and what the likely cost would be?
5. Dear Mr Barnard
6. Mr J Barnard
   Corporate Sales Department
   Procom Ltd
   58 Edison Street
   Robin's Lane Industrial Estate
   Canterbury
   Kent CT19 3TE
7. Yours sincerely
8. 12 May 19____
9. The Red Box
   54 Streamside Road
   Cardiff CF1 1JW
10. Our ref: CUG PL

Task 5

You are Mr Barnard. Reply to the letter of enquiry in Task 4.

Paragraph 1. Refer to the customer's letter. Say you are happy that the PCs have given satisfaction

Paragraph 2: Explain that the Procom 211 Premiers cannot be upgraded because that particular model has been discontinued. Say that you are enclosing the latest catalogue and draw attention to the Procom 400 PC, which would be ideal for the customer's needs. Suggest that you call soon to arrange a time and date when a representative can visit to give a demonstration of the PC.

Paragraph 3: Conclude the letter appropriately.

Task 6

Follow the instructions on the memo below. Write out the letter of enquiry in full, including names, addresses, etc.

Mark Walton is the Senior Programmer of Inlogic, Morley House, 18-22 Wolves Road, London SW1 7ND.

Memorandum

To: Laura Hayward　　Date: 27 March 19__

From: Mark Walton　　Ref

Please send a letter to ASD Computer Products who advertised in the March 23 edition of 'Info Globe'. Say where you saw the advertisement and ask them for their catalogue.

3 Quotations and orders

In reply to an enquiry you may want to provide a potential customer with a quotation. This will, of course, quote the price for the requested goods or services, but it will also give some or all of the following information.

1 details of any applicable discounts (a trade discount may be offered to companies in the same line of business while a quantity discount may apply to orders over a certain amount).
2 details of what costs (if any) are included in the price, such as transport and insurance*.
3 the preferred method and terms of payment (for example, a letter of credit payable within 30 days*
4 some indication of how long it will take for the goods to reach the customer

Note: a glossary of terms covering the most common costs included in quotations and the most common methods of payment can be found on page 187

Task 1, when completed, provides a model for this type of letter.

The order itself is likely to be written on an official order form, but it will normally be accompanied by a covering letter confirming the terms that have been agreed. The letter in Task 2, when corrected, provides a model for a covering letter to an order.

Task 1

The following letter gives a quotation. Read it and choose the best word from the options in brackets

Dear Mr Gianelli

Thank you for your fax of 18 May, in which you request a quotation for 5 EMC180 flat bed scanners.

We can offer a gross price of £3,425.00 – unit price: £685.00 c i f. Genoa. This includes a (*batch, quantity, multiple*) discount of 10%.

Payment may be (*done, made, spent*) by irrevocable letter of credit or by banker's draft. On all (*starting, initial, prime*) orders we usually require payment (*on, by, of*) delivery, and for all subsequent orders we (*make, let, allow*) a 30 day credit period. Please let us know how you would like to arrange payment.

We have the items in stock and can (*persuade, assure, console*) you that your order will be dealt with promptly. Please allow six weeks for delivery.

We look forward to hearing from you again soon.

Yours sincerely

P. J Wilson

P J Wilson
Sales Manager

Task 2

The following letter was written to accompany an order. There are 8 mistakes (grammar, style, word order, vocabulary, spelling, etc.). Can you find and correct them?

> Dear Mr P J Wilson
>
> Thank you for you fax of 19 May. Please found enclosed our order no. 88694 for five EMC180 Scanners.
>
> We would like confirming that payment for this initial order will make by banker's draft on delivery. We will take advantage of the 30 day credit period for any subsequent orders.
>
> We would appreciate if you could arrange for the scanners to be shipped as soon as possible.
>
> I look forward to hear from you in short.
>
> Yours faithfully
>
> S. Gianelli
>
> S Gianelli
> Chief Buyer
>
> Enc.

Task 3

Match the beginnings and ends of these sentences.

1	Please find enclosed our current price	**a**	cheque or credit card
2	Please fill in the order	**b**	with you for 2,000 units
3	The prices quoted are subject to	**c**	we can expect delivery.
4	Payment can be made by	**d**	discounts you can offer
5	We offer free overnight delivery on	**e**	for £395.95.
6	We would like to place an order	**f**	place further orders with you.
7	Please could you let us know what trade	**g**	list and order form.
8	If the product sells well, we will	**h**	form on Page 26.
9	Please find enclosed a cheque	**i**	orders of over £50.00
10	Please let us know when	**j**	VAT at 17.5%.

Task 4

Due to a malfunctioning word processor, the following two letters have been mixed up. One is from Discpro SA providing a quotation for a further order of software plugs. The other is from Physiologica to confirm the order. Match each missing section with the appropriate gap on the blank letters.

1 We would like to place an initial order with you for 500 RSP 11W plugs and enclose your official order form. We normally make payments by banker's draft. Could you please confirm that this is acceptable to you?

2 Further to your letter of 1 July and your meeting with Mr Gerard in London on 18 July, I am pleased to be able to give you a quotation for the software protection plugs you discussed.

3 P Varenne
Sales Manager

4 Thank you for your letter of 23 July.

5 We hope that this highly competitive price will meet with your approval, and I look forward to receiving your order.

6 Dear Mr Varenne

7 Anne Newson
Project Director

Enc.

8 Mr P Varenne
Discpro SA
251, rue des Ramonières
F-86256 POITIERS CÉDEX
France

9 I would like to point out that delivery before the end of November, as agreed with Mr Gerard, is a firm condition of this order as we hope to have the program ready for sale by then.

10 Dear Ms Newson

11 Ms Anne Newson
Project Director
Physiologica
17 Princes Street
London EC1 7DQ
UK

12 We would be able to supply 500 RSP 11W plugs at a unit cost of £17.86, including transportation costs. On any additional orders, we would be able to offer a 20% discount on the unit price.

[illegible], rue des [illegible] F 86256 POITIERS CÉDEX

Discpro SA

Tél (33) [illegible]
Télécopie (33) [illegible]

Ref PV/KH

23 July 19__

a

b

c

d

e

Yours sincerely

f

Physiologica

17 Princes Street
London
EC1 7DQ

Telephone 071 [illegible]
Telex [illegible]
Fax 071 [illegible]

Our ref AM/JS
Your ref PV/KH

27 July 19__

g

h

i

j

k

I look forward to hearing from you

Yours sincerely

l

Task 5

When writing formal letters, we often precede questions which ask for information with phrases like *Could you please let us know ...* and *Kindly inform us...*

Look at the examples below and note how the original questions change when they become part of a longer question or statement. Then change the questions which follow in the same way.

1. When/Where/How will the consignment arrive?
   Could you please let us know ***when/where/how*** *the consignment will arrive?*
2. Do you offer discounts on large orders?
   Could you tell us ***whether*** *you offer discounts on large orders?*
3. Are you interested in this offer?
   Please let us know ***whether*** *you are interested in this offer.*

1 How would you like us to pay?

Could you please let us know ______________________?

2 How many items would you like to order?

Please let us know ______________________.

3 Do you have the items in stock?

Could you please tell us ______________________?

4 Are these terms acceptable to you?

Please let us know ______________________.

5 Do you anticipate any delays with delivery?

Please let us know ______________________.

6 When would you be able to ship the order?

Kindly inform us ______________________.

7 Where would you like us to send the order?

Please let us know ______________________.

8 Would you be prepared to offer us a quantity discount?

Could you please tell us ______________________?

9 When would you like to receive payment?

Please let us know ______________________.

10 Would you like us to arrange a maintenance contract?

Kindly inform us ______________________.

Task 6

Follow the instructions from George Ramsden, Senior Project Engineer at Bespoke Assemblers, 22 Clarendon Street, Cambridge CB4 8RP

Memorandum

To Sally Parker | Date 24 July 19__

From George Ramsden

Please write a letter to Frith Components, 139 Giles Kemp Road, London N1 2RR.

1 Say we saw the advertisement for their company in the latest issue of Electronic Engineer.
2 Ask if they are able to supply the following:
   20 486DX 33 motherboards
   12 4Mb SIMM 60NS
   8 Intel Ether Express 8/16 bit switchablecards.
3 Find out what discounts they give and what their terms of payment are.

Methods of payment

Common methods of payment include:

bank transfer: payment can be made by ordering a home bank to transfer money to an overseas account. If telegraphed, the transfer is known as a telegraphic transfer (TT) and if mailed, a mail transfer (MT). The Society for Worldwide Interbank Financial Communications (SWIFT) offers facilities for a 24-hour transfer of money to a beneficiary on its computer systems.

international banker's draft: a banker's cheque which the bank draws on itself and sells to the customer, who then sends it to his supplier as he would an ordinary inland cheque. So if you have to pay your supplier £2 000, you purchase the cheque for that amount, plus charges. Usually the receiver's bank should either have an account with the sender's bank, or an agreement.

bill of exchange: the seller prepares a bill of exchange in the name of the buyer. The bill states that the buyer will pay the seller an amount within a stated time, e.g. 30 days. The bill is sent to the buyer either by post, or through a bank, and the buyer signs (accepts) the bill before the goods are sent. Shipping documents usually accompany bills when the bank acts as an intermediary in overseas transactions.

letter of credit (L/C): letters of credit (or *documentary credits*, as banks refer to them) have to be applied for from the buyer's bank, by filling out a form giving details of the type of credit (i.e. revocable, which can be cancelled, or irrevocable, which cannot be cancelled), the beneficiary (the person receiving the money), the amount, how long the credit will be available for (i.e. valid until ...), the documents involved (bill of lading, insurance, invoice, etc.), and a description of the goods. The money will be credited to the supplier's account as soon as confirmation of shipment is made. This is done when the documents are lodged with the customer's bank.

Transport and insurance costs

There are a number of abbreviations that explain the price quoted to the customer. These include:

ex-works: the buyer pays all costs once the goods leave the factory/warehouse.

f.o.r. (free on rail): includes cost of delivery to the nearest railway station.

f.a.s. (free alongside ship): includes cost of taking goods to the side of the ship, but not loading.

f.o.b. (free on board): as for f.a.s., but includes cost of loading goods.

c.& f. (cost and freight): includes cost of shipping goods to the named destination but not insurance.

c.i.f. (cost, insurance and freight): includes all costs to the named destination.

4 Letters of complaint and replies

The purpose of a letter of complaint is to get a problem solved so avoid emotional language (e.g. *I am absolutely furious...*). In any case, the person reading your letter is probably not the person who caused the problem. When replying to letters of complaint, avoid blaming a member of staff by name. Instead use a passive structure. Compare the following examples:

1. *Mrs Smith, in our accounts department, sent the wrong invoice.*
2. *The wrong invoice was sent due to an error in the accounts department.*

A letter of complaint should be structured as follows:

1. Begin with a clear reference.
2. State clearly what the nature of the complaint is.
3. Suggest a course of action that should be followed.
4. End the letter politely.

Task 1 shows a typical letter of complaint.

A reply to a letter of complaint should be structured as follows:

1. Begin with a reference to the letter.
2. If appropriate, apologize for the error and explain what happened.
3. Say what action you will take.
4. Apologize again and end the letter politely.

Task 2, when completed, provides a model for a reply to a letter of complaint.

Task 1

Read this letter of complaint and answer the questions at the top of the following page.

PRINCES MARKETING

Nesson House Newell Street Birmingham B3 3EL

14 May 19__

Mr P R Smith
Sales Manager
Wildman Office Equipment
18 Station Lane
London N8 4HB

Dear Mr Smith

I am (complaining, writing, referring) regarding the consignment of 14 Olivetti 486 PCs, Order no. 3982/JKS which was delivered on 12 May.

It was clearly stated on the order form that these machines should be pre-loaded with the latest version of DOS. Unfortunately, they have all been loaded with DOS version 3.1, and we are therefore unable to run a number of programs. In addition, you agreed to supply all the necessary cables, but three of these are missing.

Could you please send one of your representatives to load the machines with the correct version of DOS as soon as possible. In addition, please send the three cables (part number CN-H97/K) as soon as possible.

Yours sincerely

G O Panting

G O Panting
Operations Manager

1 Does the letter begin with a clear reference to the particular consignment?
2 What is Mr Panting's complaint?
3 What does he want the supplier to do?
4 Do you think the letter is polite enough?

Task 2

Here is the reply to Mr Panting's letter. Fill in the missing prepositions.

Wildman Office Equipment

18 Station Lane
London SE8 4HH

Telephone 071 996 6431/23
Telex 485881
Fax 071 996 6444

Your Ref
Our Ref

17 May 19_

Mr G O Panting
Operations Manager
Princes Marketing
Nesson House
Newell Street
Birmingham B3 3EL

Dear Mr Panting

Thank you 1____ your letter 2____ 14 May regarding problems 3____ a consignment that was recently sent 4____ you.

The difficulty appears to have arisen 5____ a misunderstanding 6____ our ordering department, and the matter has now been put right.

I have asked our Corporate Computing Consultant Mr R Marley, to call 7____ you 8____ Friday 21 May 9____ 9 a.m. to ensure that the PCs are correctly loaded and to supply the three cables that were left 10____ of the order.

I will telephone you to check that this meeting is convenient, and in the meantime, I would like to apologize 11____ the inconvenience that has been caused.

Yours sincerely

P R Smith

P R Smith
Sales Manager

Task 3

Rewrite these sentences using the passive, beginning with the words indicated.

1 You have sent us the wrong items again.

The wrong ______________.

2 You should have delivered this consignment last week.

This consignment ______________.

3 Someone broke two of the VDUs during transportation.

Two ______________.

4 Someone sent the order by sea mail instead of air mail.

The order ______________.

5 Please let me know when you think you can sort this matter out

Please let me know when you think this matter

______________.

6 You should have sent the documents by registered post.

The documents ______________.

7 A faulty connection could have caused the problems with the hard disk

The problems with the hard disk ______________

8 You omitted the manuals from the order.

The manuals ______________.

9 You delivered the printers over three weeks late.

The printers ______________.

10 We will not pay the invoice until this problem is rectified

The invoice ______________.

Task 4

Match the beginnings and ends of these sentences.

1 I am writing to complain about the late
2 I am writing with reference
3 We are returning the goods to you because
4 Please arrange for the goods to be
5 Please send us a refund for
6 Please accept my apologies
7 The problem arose due to
8 We would like to apologize for the error

a collected from the factory.
b on the invoice.
c a fault in the manufacturing process
d we are not satisfied with them.
e delivery of items I ordered last week.
f to order UH-879/94.
g the full amount
h for the inconvenience.

Task 6

Look at the following letter of complaint from Physiologica to their suppliers.

1 In pairs or small groups, decide:
   a how effective the letter is
   b how it could be improved.

2 Rewrite the letter in a more concise and appropriate manner (in about 80 words). Use the spaces provided.

Physiologica

17 Princes Street
London
EC1 7DQ

Telephone 071 982 7111
Telex 988153
Fax 071 982 7712

Our ref. AN/JS
Your ref. PV/KH

12 November 19 __

Mr P Varenne
Discpro SA
251, rue des Ramonières
F-86256 Poitiers
Cédex
France

Dear Mr Varenne

When we began this association, I had great hopes that everything would run smoothly, and there was little reason to suppose that your organization was in fact a TOTAL SHAMBLES; and to be quite frank with you, it astonishes me that you have managed to stay in business for as long as you have. You've made a complete mess of our order.

____

____

We made it clear that we wanted the software protection plugs by the end of NOVEMBER because we were going to start selling our program. Time and time again, you said that there was no problem, and yet here we are, two weeks from the launch of the program, and there isn't a plug in sight. I am absolutely furious, and so is everyone else here.

____

____

Now listen: this is your very last chance. Get those plugs here within five days or the deal is off, and we'll go to someone else. OK? And if that means that you lose your development costs, that's your problem.

____

____

I advise you to contact me immediately because I'm finding this situation an incredible strain, and I can't take much more of this.

____

Yours sincerely

Anne Newson

Anne Newson

Task 6

You are Mr Varenne. Write a reply to the letter from Ms Newson.

1. Thank her for her letter.
2. Apologize for the difficulties the late delivery is causing. Explain that a small number of the plugs had a technical fault caused by a problem in the manufacturing process. You have now sorted the problem out.
3. Say you have now sent the full consignment of plugs and they will arrive within the next few days.
4. Apologize for the delay and end your letter politely.

5 Employment

When you apply for a job, you may need to fill in a company application form which asks for personal details, your qualifications, and your work history. Alternatively, you may be asked to supply a curriculum vitae, which gives similar information, but which you write yourself.

In either case, you will need to write a covering letter to go with the application form or CV. Most jobs will have been advertised in the papers or specialist publications, and before you write your covering letter you should study the wording of the advertisement carefully. Find out exactly what the employer is looking for (for example, a certain amount of experience, familiarity with particular languages, etc.). Then, in your covering letter, try to show that you have all the qualities, qualifications, and experience that the employer is looking for. You should not simply repeat all the information in the CV, you should highlight the most important parts.

Task 1

Read this advertisement and answer the questions that follow.

Systems Programmers to £20,000 - London

Our client is a major UK clearing bank whose range of activities is as impressive as the growth of its profits. A bank that is dedicated to a long-term programme of systems development.

With IBM RS/6000, System 38 and VAX hardware driving user-interface PC networks using C, UNIX, FOXPRO, and SYBASE, there's no doubting our client's commitment to systems innovation and investment.

We are looking for SYSTEMS PROGRAMMERS with C and UNIX skills, who can show us 2 years' experience of delivering advanced banking and online information systems. Above all, we need flexible thinkers who appreciate the commercial realities and priorities of the banking industry.

Show us these qualities, and our client can offer you a competitive salary plus many banking benefits. If your talents and ambitions are ready for such a move, please send your CV, quoting Ref. 349, to:

Harriet Bradman at Compro Recruitment Services, 318 Leadhill Street, London EC1 1DR.

1. Who placed the advertisement?
2. What software does the current system use?
3. What specific characteristics or qualities are required?
4. What benefits come with the job?

Task 2

David Manning has applied for the job advertised in Task 1 Before reading his letter, tick the items you think he should mention in replying to the advertisement

Do you think he should:

1 ☐ begin with a reference to where he saw the job advertised?
2 ☐ give details of the subjects he studied at school?
3 ☐ list briefly all previous jobs?
4 ☐ be honest and admit that he lacks exactly the required experience?
5 ☐ indicate his current level of responsibility?
6 ☐ explain why the company would benefit if they employed him?
7 ☐ say when he will be available for interview?
8 ☐ request that they reply as soon as is reasonably possible?

Now read the letter and compare your predictions. Do you think it is a good letter? Discuss the reasons for your opinion

22 Carlyle Crescent
London WC1H 9BH

18 June 19__

Yr Ref: 349

Ms H Bradman
Compro Recruitment Services
318 Leadhill Street
London EC1 1DR

Dear Miss Bradman

I wish to apply for the post of Systems Programmer, which was advertised in this month's edition of IT World.

I am currently a Systems Programmer at GCG Merchant Bank where I have two years' experience of specialized programming for the financial sector. I am familiar with C/UNIX, LAN/WAN technology, and relational databases.

Prior to taking over my current post, I worked for Data International as a Trainee Systems Programmer, where I was involved in the development of a new online information system for a financial services company.

My experience in the fields of both banking and online information services has given me the necessary commercial and technical awareness to be able to make a valuable contribution to the systems development programme of your client.

Please let me know if there is any further information you require.

I look forward to hearing from you.

Yours sincerely

David Manning

David Manning

Task 3 The advertisement mentioned three specific requirements for the job. Write down the phrases that David Manning used when referring to those requirements.

1 ______________________

2 ______________________

3 ______________________

Task 4 Using the information from the letter, complete the following CV that David Manning sent with the covering letter.

CURRICULUM VITAE

Personal details

Name: David William MANNING
Age: 21
Date of Birth: 29 May 19__
Marital Status: Single
Address: 1 ______________________
____
____
Tel: 071 263 6925

Position applied for: 2 ______________________

Education

19__ to 19__ — St Godric's School, Buckingham
General Certificate of Education

Mathematics	*B*
Physics	*A*
English	*B*
German	*D*

19__ to 19__ — Aston Technical College, Birmingham
OND in Computing

Work experience

19__ to present — Company: GCG Merchant Bank
Post: 3 ______________________
Responsibilities: 4 ______________________
____

19__ to 19__ — Company: 5 ______________________
Post: 6 ______________________
Responsibilities: assisting in the development of a new online information system for a financial services company.

Other information — Clean driving licence

Referees

Mr Joseph Morse	Mr J H Holloway
Systems Manager	Data Processing Manager
GCG Merchant Bank	Data International
Threadneedle Street	106 Sidmouth Street
London EC1 7GH	London WC1H 4GJ

Current Salary — £16,500 p.a

Task 5

In each of the following sentences, choose the most appropriate word from the options in brackets

1 I am writing to (*apply, request, ask*) for the post of Sales Consultant advertised in today's edition of 'The Independent'.
2 I enclose my curriculum vitae for the (*job, position, work*) of Program Manager.
3 As you will see from the enclosed (*CV, covering letter, application*), I have had several years' experience of Export Sales.
4 I (*qualified, left, graduated*) from Manchester Technical College with an HND in Electronic Engineering.
5 At present I am (*worked, employed, taken*) by Unisys, where I work in the Customer Services Department
6 I would be grateful if you could send me an application (*form, formula, card*)
7 While I was at Dell, I was (*liable, responsible, charged*) for the day-to-day running of the Technical Services Department.
8 At ICL my duties (*included, added, completed*) installing and testing new computer systems.
9 I look (*forward, ahead, on*) to hearing from you.

Task 6

Complete the CV with all the relevant information about yourself

CURRICULUM VITAE

Personal details

Name ____________________

Date of birth ____________________

Address ____________________

____

____

Telephone number ____________________

Education ____________________

____

____

Work experience ____________________

____

____

Other information ____________________

____

Referees

____________________ ____________________

____________________ ____________________

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Task 7

Compro Recruitment Services are advertising a number of jobs. Choose a job and write a covering letter to send with your completed CV.

Begin by saying which post in particular you are applying for.
Give relevant details about yourself and your experience, qualifications.
Say why you would be useful to the company.
Close your letter politely.

Sales and support
£12,000 to £15,000

A growing company requires an experienced PC Consultant to provide technical support for both specialist systems and general packages including word processors, spreadsheets, and databases. Additional responsibilities will include dealing with sales enquiries, both at exhibitions and on the telephone. Full training in this area will be provided.

Ref. S/167

Programmers/Analyst programmers
To £20,000

A [illegible] financial organization requires an experienced person with a thorough knowledge of UNIX and 'C'. You will need excellent communication skills and be able to work effectively as a member of a team. This company offers excellent benefits and prospects [illegible]

Ref. P/256

Network manager
£16,000 to £20,000

Well-known manufacturers seek ambitious candidate with one to two years' experience of using Lotus, Paradox, WordPerfect, and Harvard Graphics. A knowledge of Windows will be a definite advantage. Working within a small team, you will be solely responsible for the support and management of forty to fifty PCs [illegible]

Ref. N/60

Junior support
£15,000 + benefits

A specific requirement has arisen in an international bank. A vacancy exists for a PC support professional to work within a small team. You will be the first point of contact for dealing with problems relating to software, hardware, and networks. Candidates should have a minimum of 18 months experience. Further training will be given on the job. Knowledge of mainstream PC software is essential, i.e. Windows, Excel, Lotus, WordPerfect. You should be well presented with excellent interpersonal skills. Very attractive position with much scope for career progression.

Ref. S/168

Analyst programmers
£ negotiable

Analyst programmers with at least two years' 'C' or OS/2 experience looking to move into a truly dynamic development environment should call us NOW! The package is negotiable and promotion prospects are excellent for those prepared to work hard.

Ref. P/257

If you are interested in any of the above vacancies, contact Valerie Stevenson at:

FASTRECRUIT
16 Wolvercote Avenue
Bolton
BL2 6CT

Telephone
0204 [illegible]340

Appendix 2
Glossary of technical terms and abbreviations

The definitions in this glossary refer to words only as they are used in this book. The meanings of certain words will vary according to context. As the texts in this book are authentic and come from a variety of sources, some inconsistency in hyphenation and spelling is inevitable.

How to use the Glossary

headword

unit in which headword first occurs

unit which refers to headword in detail

artificial intelligence /ˌɑːtɪfɪʃl ɪnˈtelɪdʒəns/ [4, 13] the discipline concerned with the building of computer programs that perform tasks requiring intelligence when done by humans

pronunciation

definition of headword

operator /ˈɒpəreɪtə(r)/ **1** [C] someone responsible for running a computer (usually a mainframe) **2** [4] *see* relational operator

reference to other headword(s)

number of definition

Abbreviations used in the text

n = noun
v = verb
adj = adjective

7-bit code /ˌsevn bɪt ˈkəʊd/ [3] a coding system which uses seven bits to represent a character, giving a possible 128 different patterns. *See* ASCII.

8-bit code /eɪt bɪt ˈkəʊd/ [3] a coding system which uses eight bits to represent a character, giving a possible 256 different patterns. *See* EBCDIC

8-bit colour /eɪt bɪt ˈkʌlə(r)/ [15] describing colour monitors which use eight bits to control 256 possible shades of grey or 256 colours

24-bit colour /ˌtwentɪ ˌfɔː bɪt ˈkʌlə(r)/ [15] describing colour monitors which use eight bits to control each of the red, green, and blue electron guns. This gives 256 shades for each of the three colours, allowing a total of 16.7 million colour shades.

32-bit colour /ˌθɜːtɪ ˌtuː bɪt ˈkʌlə(r)/ [15] describing colour monitors which have 24-bit colour with an additional 256 possible transparent colour overlays



access /ˈækses/ *v* [10] connect to, or get (information) from, a system or a database

access control /ˈækses kənˌtrəʊl/ [7] a feature of a computer security system which prevents unauthorized users from accessing a system

access request /ˈækses rɪˌkwest/ [10] a user request for data from a database

accumulator /əˈkjuːmjʊˌleɪtə(r)/ [1] a register that holds the results of operations performed by the arithmetic portion of the CPU

acoustic coupler /əˈkuːstɪk ˈkʌplə(r)/ [3] a device that converts the digital data of the computer into a sound signal that can be understood and transmitted by a telephone network. The connection is usually made by placing the handset of a telephone into rubber cups containing a microphone and a loudspeaker

adaptor board /əˈdæptə ˌbɔːd/ [1] a circuit board put in a spare slot in a microcomputer to control an external device

A/D converter /eɪ diː kənˈvɜːtə(r)/ [8] analog-to-digital converter: an electronic circuit that changes analog signals to digital signals

address /əˈdres/ [1] a location within the memory of a computer

address bus /əˈdres ˌbʌs/ [1] a signal route within a computer dedicated to sending address information. This may be a subset of the system bus.

address register /əˈdres ˌredʒɪstə(r)/ [1] a register which stores an address in memory

AI /ˌeɪˈaɪ/ [13] artificial intelligence

ALGOL /ˈælgɒl/ [4] algorithmic language: a language developed for mathematical and scientific purposes

algorithm /ˈælgərɪðm/ a prescribed set of well-defined rules or instructions for the solution to a problem

alphanumeric /ˌælfənjuːˈmerɪk/ *adj* used to describe data that contains numbers and letters

analog /ˈænəlɒg/ *adj* [3] describing a smoothly varying signal that has no discontinuities

analogue /ˈænəlɒg/ *see* analog

analyst /ˈænəlɪst/ [4] someone responsible for understanding a problem in a business environment and designing a computer system to solve it

android /ˈændrɔɪd/ [11] a mobile robot whose structure approximately resembles that of a human

ANSI /ˈænzɪ/ American National Standards Institute: an industry-supported standards organization founded in 1918 that establishes US industrial standards and their correspondence to those established by the International Standards Organization (ISO)

anti-glare shield /ˌæntiˈgleə ʃiːld/ [8] a protective screen over the front of a computer screen to reduce the amount of reflected light

APL /eɪ piː ˈel/ [4] a programming language originally devised as a mathematical notation and later turned into a language

application(s) program /ˌæplɪˈkeɪʃn(z) ˌprəʊgræm/ [2,4] a program written in a high level language, designed to perform a specific function such as calculate a company's payroll

application software /æplɪˈkeɪʃn ˌsɒftweə(r)/ applications programs (i.e. programs that directly meet the needs of the computer user). In contrast, systems software (part of the operating system), although essential, does not directly meet any specific user needs

arithmetic-logic unit /əˈrɪθmətɪk ˈlɒdʒɪk ˌjuːnɪt/ [1] the component of the CPU which performs the actual arithmetic and logic functions asked for by a program

arithmetic unit /əˈrɪθmətɪk ˌjuːnɪt/ [1] *see* arithmetic-logic unit

artificial intelligence /ˌɑːtɪfɪʃl ɪnˈtelɪdʒəns/ [4,13] the discipline concerned with the building of computer programs that perform tasks requiring intelligence when done by humans

ASCII /ˈæski/ [3] American standard code for information interchange: a standard character encoding scheme introduced in 1963. It is a 7-bit code allowing 128 different bit patterns or characters.

Assembler /əˈsemblə(r)/ [4] a program that takes as input a program written in assembly language and translates it into machine code

assembly language /əˈsemblɪ ˌlæŋgwɪdʒ/ [4] a human-readable representation of machine-code programs

assignment statement /əˈsaɪnmənt ˌsteɪtmənt/ [4] a fundamental statement of most programming languages that assigns a new value to variables

asynchronous /eɪˈsɪŋkrənəs/ [14] describing a form of computer control timing in which a specific operation is begun as soon as a signal is received to indicate that the preceding operation has been completed

AT-compatible /ˌeɪˌtiː kəmˈpætəbl/ [14] describing a computer which can run the same software as the IBM PC model AT

audio board /ˈɔːdɪəʊ ˌbɔːd/ [14] a computer expansion board that allows sound to be recorded and played back by the computer

audio note /ˈɔːdiəʊ ˌnəʊt/ [14] in multimedia, a digitized audio message that can be attached to text or graphics

auto-kerning /ˈɔːtəʊˌkɜːnɪŋ/ [5] a word-processing feature that automatically adjusts the space between the characters of a typeface to give the best looking fit

automate /ˈɔːtəmeɪt/ v [11] use automatic equipment and machines to perform an activity previously done by people

automaton /ɔːˈtɒmətən/ [11] a machine capable of operating independently, such as a clothes drier

auto numbering /ˈɔːtəʊ ˈnʌmbərɪŋ/ [5] a feature that automatically numbers diagrams, paragraphs, etc., in a document

B

B /biː/ [4] a programming language derived from BCPL

background /ˈbækgraʊnd/ [2] describing processing which does not involve computer–user interaction. Such processes use spare computer resources to perform low-priority tasks

backing storage /ˈbækɪŋ ˈstɔːrɪdʒ/ [1] see secondary memory

backup /ˈbækʌp/ n a copy of a piece of data or a program taken in case something happens to the data or to the disk on which the original data is stored

back up /ˌbæk ˈʌp/ v [2] take a backup

bandwidth /ˈbændwɪtθ/ [14] the difference between the lowest and highest frequency in a group of frequencies

bar code /ˈbɑː kəʊd/ [K] a machine-readable printed code that consists of parallel bars of varied width and spacing, usually used to code goods

bar code scanner /ˈbɑːkəʊd ˈskænə(r)/ [K] a scanning device that can read bar codes as input

BASIC /ˈbeɪsɪk/ [4] beginners' all-purpose symbolic instruction code: a programming language developed in the mid-1960s to exploit the capability (new at that time) of the interactive use of a computer from a terminal

batch program /ˈbætʃ ˈprəʊgræm/ [2] a program that runs without any terminal or user interaction. Typically such programs perform large scale updates, produce reports, or handle housekeeping functions. A high priority batch job may be run in foreground.

BCPL /ˌbiː siː piː ˈel/ [4] a programming language used for systems programming

binary adder /ˈbaɪnəri ˈædə(r)/ [L] the portion of the arithmetic-logic unit which performs binary addition and subtraction

binary arithmetic /ˌbaɪnəri əˈrɪθmətɪk/ [4] arithmetic done to the base 2 using only 0 and 1 as its basic digits

binary number /ˈbaɪnəri ˌnʌmbə(r)/ [15] a number (0 or 1) used in binary arithmetic

bistable /ˌbaɪˈsteɪbl/ [1] an electronic circuit whose output can have one of two stable states, i.e. on or off

bit /bɪt/ binary digit holding the value 0 or 1; the smallest unit of information in a computer system

bit-mapped /ˈbɪtmæpt/ [6] describing the image displayed on a computer screen whereby each pixel corresponds to one or more bits in memory

BIX /bɪks/ [3] Byte Information Exchange: an online service

block /blɒk/ a physical group of records on a tape or disk. A number of blocks form a file. Records are blocked together to improve I/O throughput

Boolean algebra /ˌbuːliən ˈældʒəbrə/ an algebra closely related to logic in which the symbols do not represent arithmetic quantities

boot /buːt/ v [2, 7] reload the operating system of a computer

broadcast /ˈbrɔːdkɑːst/ [6] a message-routing algorithm in which a message is transmitted to all nodes in a network

bug /bʌg/ n an error in a program

bulletin board /ˈbʊlətɪn ˌbɔːd/ [3] a teleconferencing system that allows users to read messages left by previous users on a variety of topics. All users can see all messages, unlike e-mail where the message is private

bus /bʌs/ [1] a signal route within a computer to which several items may be connected so that signals may be passed between them

bus network /ˈbʌs ˈnetwɜːk/ [6] a network topology which is non-cyclic with all nodes connected. Traffic travels in both directions and some kind of arbitration is needed to determine which terminal can use the network at any one time

byte /baɪt/ [2] a character consisting of 8 binary digits or bits

C

C /siː/ [4] a highly portable programming language originally developed for the UNIX operating system, derived from BCPL via a short-lived predecessor B

C++ /siː plʌs plʌs/ [4] a programming language combining the power of object-oriented programming with the efficiency and notational convenience of C

cabling /ˈkeɪblɪŋ/ [6] the wiring used to carry the signals for a network

CAL /kæl/ Computer Assisted Learning: one of several terms used to describe the use of computers in training and education

CALL /kæl kɔːl/ [9] Computer Assisted Language Learning: the use of computers in the teaching of languages

capacity /kəˈpæsəti/ [2] the amount of free unused space left on a disk

CBT /siː biː ˈtiː/ [9] computer-based training; *see* CAL

CD-ROM /siː diː ˈrɒm/ [8] the predominant form of ROM optical disk. Both disk and drive are based on the product used for commercial music systems. The disk is 120mm in diameter, single-sided, and holds up to 600Mb of data

cell /sel/ [A] a location in a spreadsheet capable of holding text, numeric data, or a formula

central processing unit /ˌsentrəl ˈprəʊsesɪŋ ˌjuːnɪt/ [1] the principal operating part of a computer, consisting of the arithmetic unit and the control unit

channel /ˈtʃænəl/ [1] a specialized processor that consists of an information route and associated circuitry to control input/output operations. More than one I/O device may be attached to a channel for fast accessing and updating of information.

check point /ˈtʃekpɔɪnt/ [2] a point in a series of programs at which a backup is taken, and the point at which the series of programs will be restarted

chip /tʃɪp/ [F] *see* microchip

circuit /ˈsɜːkɪt/ [1] a combination of electrical devices and conductors that form a conducting path

circuit board /ˈsɜːkɪt ˌbɔːd/ [1] a board containing integrated circuits which make up the processor, memory, and electronic controls for the peripheral equipment of microcomputers

click /klɪk/ *v* [1] press the button on a mouse to initiate some action or mark a point on the screen

clipboard /ˈklɪpbɔːd/ [2] *see* portable computer

clock /klɒk/ [1] an electronic device that generates a repetitive series of pulses, used to control and synchronize the internal workings of a computer

cluster controller /ˈklʌstə kənˌtrəʊlə(r)/ [3] a device that controls a number of similar peripheral devices such as terminals and links them up to the main computer

coaxial cable /kəʊˈæksɪəl ˌkeɪbl/ [6] a type of network cable consisting of two wires, one of which is contained totally within the other

COBOL /ˈkəʊbɒl/ [4] common business-oriented language: a high-level language designed for commercial business use

code /kəʊd/ *n* [7] the representation of information data in symbolic language or in a secret fashion

code /kəʊd/ *v* write a computer program

cold-boot /kəʊld buːt/ *v* [7] load the operating system of a computer from 'cold' (i.e. when the computer has to be switched on first)

command-based /kəˈmɑːnd ˌbeɪst/ [1] a computer system which interacts with the user by commands entered at a prompt on the screen. *See* command line interface.

COMMAND.COM /kəˌmɑːnd ˈkɒm/ [7] the main part of DOS

command line interface /kəˌmɑːnd laɪn ˈɪntəfeɪs/ a method of interaction with a computer whereby the user types specific commands in order to achieve his requirements. This is generally regarded as not very user-friendly, although it is often the most efficient way of communicating with the computer.

comment /ˈkɒment/ [4] part of a program text included for the benefit of the human reader and ignored by the compiler

compile /kəmˈpaɪl/ *v* [4] interpret a source program or a list of instructions in symbolic language

compiler /kəmˈpaɪlə(r)/ *n* [4] a program which converts source programs into machine code. Each high-level language has its own compiler.

compound document /ˈkɒmpaʊnd ˈdɒkjʊmənt/ [14] an electronic document which may contain text, photographs, spreadsheets, audio, or graphics

compress /kəmˈpres/ *v* [14] in multimedia, to force digitized data into a smaller space for handling by the system

CompuServe /ˈkɒmpjuːˌsɜːv/ [3] an online service

computational psychology /ˌkɒmpjuːˌteɪʃənəl saɪˈkɒlədʒɪ/ [13] a discipline lying across the border of artificial intelligence and psychology concerned with building computer models of human cognitive processes. It is based on an analogy between the human mind and computer programs

computer /kəmˈpjuːtə(r)/ [1] put simply, a system that is capable of carrying out a sequence of operations in a distinctly and explicitly defined manner

computer centre /kəmˈpjuːtə ˌsentə/ [7] a place where there is a central computer facility usually containing mainframes

computer game /kəmˈpjuːtə geɪm/ [1] an interactive game played against a computer

computerize /kəmˈpjuːtəraɪz/ *v* [1] provide a computer to do the work of/for something

computer language /kəmˈpjuːtə ˈlæŋgwɪdʒ/ [5] *see* programming language

conceptual schema /kənˈseptʃʊəl ˈskiːmə/ [10] the logical design of a database

conference /ˈkɒnfrəns/ [3] a computer based system enabling users to participate in a joint activity despite being separated in space or time

configuration /kənˌfɪgʊˈreɪʃn/ [6] the particular hardware elements and how they are interconnected in a computer system or network

consultant /kənˈsʌltənt/ [6] a (computer) expert brought in to give advice

control bus /kənˈtrəʊl bʌs/ [1] a signal route within a computer dedicated to the sending of control signals

control flow construct /kənˈtrəʊl fləʊ ˈkɒnstrʌkt/ [4] a syntactic form in a programming language to express the flow of control. Common structures are 'if ... then ... else ...', 'while ... do ...', 'repeat ... until ...' and 'case'.

control function /kənˈtrəʊl ˌfʌŋkʃn/ [1] a function performed by the control unit of a computer co-ordinating the internal functions and passing commands to the processor

control signal /kənˈtrəʊl ˌsɪgnəl/ [2,12] an electronic signal sending a control message to another part of the computer or to a robot

control unit /kənˈtrəʊl ˈjuːnɪt/ [1] one of the two main components of the CPU. It transmits co-ordinating control signals and commands to the computer

counter /ˈkaʊntə(r)/ [L] a component of the control unit which selects instructions one at a time from memory

CPU /ˌsiː piː ˈjuː/ [1] central processing unit

crash /kræʃ/ n [6] a severe failure of a computer system that causes the hardware or software to be restarted

cursor /ˈkɜːsə(r)/ a symbol on a computer screen that indicates the active position, e.g. the position at which the next character to be entered will be displayed

cut and paste /ˌkʌt ənd ˈpeɪst/ [B] a word-processing or desktop publishing software feature which allows the user to mark a piece of text and then move it to a different location, not necessarily in the same document

cyborg /ˈsaɪbɔːg/ [11] an android with organic structures. Cyborgs have some physiological structures similar to human beings



data /ˈdeɪtə/ [1] information that has been prepared, often in a particular format, for a specific purpose. The term is used in computing to distinguish information from program instructions.

databank /ˈdeɪtəbæŋk/ [7] *see* database

database /ˈdeɪtəbeɪs/ [1,10] a file or group of files structured in such a way as to satisfy the needs of various users and accessed using the facilities of a database management system

database management system /ˈdeɪtəbeɪs ˈmænɪdʒmənt ˌsɪstəm/ [9,10] a software system designed to handle multiple requests for data access while at the same time maintaining the integrity of the data

data bus /ˈdeɪtə bʌs/ [1] a bus dedicated to sending data between different parts of a computer

data frame /ˈdeɪtə ˌfreɪm/ [3] one of a number of predefined slices into which data may be broken for transmission

data-manipulation language /ˌdeɪtə məˌnɪpjʊˈleɪʃn ˌlæŋgwɪdʒ/ [10] a sublanguage of a database language providing facilities for storing, retrieving, updating, and deleting data records

data processing /ˈdeɪtə ˌprəʊsesɪŋ/ [4] the handling or manipulating of information called data which is specially prepared to be understood by the computer

DBMS /ˌdiː biː em ˈes/ [9,10] database management system

debug /ˌdiːˈbʌg/ v remove bugs from a program

DEC /dek/ [4] Digital Equipment Corporation

decision support system /dɪˈsɪʒn səˈpɔːt ˌsɪstəm/ [8] (computerized) system designed to aid managers in day-to-day operational decisions

declaration statement /ˌdekləˈreɪʃn ˌsteɪtmənt/ [4] in C, the element of the program that introduces an entity, giving it a name and establishing its properties

dedicated /ˈdedɪkeɪtɪd/ [1] used exclusively for something

delete key /dɪˈliːt kiː/ [2] the key on a keyboard which, when the cursor is placed over a character, deletes it

desktop publishing /ˌdesktɒp ˈpʌblɪʃɪŋ/ [5] the use of a computer system to perform many of the functions of a printing shop, including page layout and design, choice of fonts, and the inclusion of illustrations. The output may be sent to a printer or to a high quality typesetter

detonator /ˈdetəneɪtə(r)/ [7] a device used to set off another process or event

device /dɪˈvaɪs/ [1] a piece of hardware that is attached to a computer and is not part of the main central processor (CPU)

device control /dɪˈvaɪs kənˈtrəʊl/ [3] the use of control characters to control external devices

dialling up /ˈdaɪəlɪŋ ˈʌp/ [8] using a modem to connect a terminal or PC to a remote computer

digit /ˈdɪdʒɪt/ a number which has only one character: 0, 1, 2, 3, 4, 5, 6, 7, 8 or 9

digital /ˈdɪdʒɪtəl/ [3] the use of discrete digits to represent arithmetic numbers

digital signal /ˌdɪdʒɪtəl ˈsɪgnəl/ [3] a wave form or signal whose voltage at any particular time will be at any one of a group of discrete values (generally a two-level signal)

digital transmission /ˌdɪdʒɪtəl trænzˈmɪʃn/ [3] the sending of digital signals along a communications link

digitize /ˈdɪdʒɪtaɪz/ v [14] convert analog signals to digital representation

digitized sound /ˌdɪdʒɪtaɪzd ˈsaʊnd/ [8] sound waves that have been converted into a series of bit strings for digital representation

DIP /dɪp/ [8] document image-processing

directory /ˌdaɪ-, ˌdɪˈrektəri/ [2] *see* disk directory

disk /dɪsk/ [2] a storage device in the form of a circular magnetic plate in which the information is stored via magnetic encoding

disk directory /ˈdɪsk daɪˌdɪˈrektəri/ [2] an index to the contents of a disk

disk drive /ˈdɪsk draɪv/ [2] a device which is capable of transmitting magnetic impulses representing data from the disk to the computer memory and vice versa

disk error /ˈdɪsk ˌerə(r)/ [2] a detected (or otherwise) error in the way that data is stored on the surface of a magnetic disk. Such errors are usually detected when reading from or writing to the disk.

diskette /dɪˈsket/ *see* floppy disk

display /dɪsˈpleɪ/ [8] *see* VDU

distributed (computer) system /dɪˈstrɪbjʊtɪd (kəmˈpjuːtə) ˈsɪstəm/ [6] the organization of processing whereby each process is free to process local data. The processes exchange information with each other over a network.

document /ˈdɒkjʊmənt/ v [4] produce the material that serves to describe a program and make it more readily understandable

document image-processing /ˈdɒkjʊmənt ˈɪmɪdʒ ˌprəʊsesɪŋ/ [8] a system which takes scanned images of documents and stores them on computer for access, rather than filing the paper copies of the document

document processing /ˈdɒkjʊmənt ˈprəʊsesɪŋ/ [14] the machine-processing, reading, sorting, etc. of documents that are generally readable both by humans and computers, e.g. bank cheques

DOS /dɒs/ [2] disk operating system: the generic term for the operating system developed for IBM PCs and their clones

download /ˈdaʊnləʊd/ v [3] send programs or data from a central computer to a remote terminal or PC

DR/DOS /diː ɑː ˈdɒs/ [1] Digital Research disk operating system

DTP /diː tiː ˈpiː/ [5] desktop publishing

dump /dʌmp/ v [2] in a system handling large numbers of users' files stored on magnetic disk, to take a periodic record of the state of the disks that are made on magnetic tape, in order to protect against accidental overwriting or mechanical failure of the disks



EBCDIC /ˈebsɪdɪk/ [3] extended binary coded decimal interchange code: a proprietary IBM character encoding scheme based on eight bits allowing 256 characters

electronic circuit /ˌelekˈtrɒnɪk ˈsɜːkɪt/ [1] a combination of electrical devices and semiconductors that form a conducting path

electronic mail /ˌelekˈtrɒnɪk ˈmeɪl/ [3,8] messages sent between users of computer systems, where the system is used to hold and transport messages. Sender and receiver need not be online at the same time.

electronic publishing /ˌelekˈtrɒnɪk ˈpʌblɪʃɪŋ/ [E] the publishing of text in an electronic format

e-mail /ˈiː meɪl/ [3,8] electronic mail

ergonomic /ˌɜːgəˈnɒmɪk/ *adj* [8] describing something which is designed to take into account the human who is to use it

execute /ˈeksɪkjuːt/ v [2] run a program in a computer

expansion /ɪkˈspænʃn/ [6] the addition of extra facilities or features

expansion board /ɪkˈspænʃn bɔːd/ [6] a printed circuit board that may be inserted into a computer to give it extra functionality

expansion slot /ɪkˈspænʃn ˌslɒt/ [2] a spare space on the system board of a computer to which expansion boards can be fitted

expert system /ˈekspɜːt ˈsɪstəm/ [13] a system built for problem solving which tries to emulate the skills of a human expert. The result of study in the field of artificial intelligence

external schema /ɪkˌstɜːnəl ˈskiːmə/ [10] a user's permitted view of data in a database



facsimile machine /fækˈsɪməli məˌʃiːn/ a machine which will provide electronic transmission of documents over telephone lines

fault-tolerant /ˈfɔːlt ˌtɒlərənt/ [6] of a computer system, having the ability to recover from an error without crashing

fax /fæks/ n **1** [8] facsimile machine **2** the output from a facsimile machine

fax board /fæksbɔːd/ [E] an adaptor board which can be put into a computer and linked to a telephone line to replicate the functions of a facsimile machine directly from the computer

FDD /ˌefdiːˈdiː/ [2] floppy disk drive

feature /ˈfiːtʃə(r)/ [1] facility provided by an application

fibre optics /ˈfaɪbər ˈɒptɪks/ [6] data transmission using cable made of optical fibres instead of copper wire

field /fiːld/ [10] an item of data consisting of a number of characters or bytes to form a number, a name, or an address

firmware /ˈfɜːmweə(r)/ [1] system software (part of the operating system) that is held in ROM

file /faɪl/ [2] information held on disk or tape in order for it to exist beyond the time of execution of a program. Files may hold data, programs, text, or any other information.

file encryption /faɪl enˈkrɪpʃn/ [7] a security method whereby an algorithm is used to scramble the data before it is written to disk to prevent unauthorized users reading the data directly from the disk

fixed-format record /ˌfɪkst ˈfɔːmæt ˈrekɔːd/ [10] a record whose data items are fixed in nature (in contrast to records whose layout may change according to the data being held)

flicker /ˈflɪkə(r)/ [14] on a screen, the rapid increase and decrease of brightness

floppy (disk) /ˈflɒpi ˈdɪsk/ [2] a flexible magnetic disk which can be removed from the computer. The two most common sizes are 3 inch and 5 inch

flowchart /ˈfləʊtʃɑːt/ [10] a diagram or a sequence of steps which represent the solution to a problem. Arrows are used to show the sequence of events

footprint /ˈfʊtprɪnt/ [8] the amount of desk or floor space taken up by a computer

foreground /ˈfɔːgraʊnd/ [2] describing high-priority processing involving interaction with the user, in an environment that allows background tasks

format /ˈfɔːmæt/ v [2] prepare a disk for use by a computer whereby the structure or the pattern of information to be held on the disk is written to the disk surface

FORTRAN (77) /ˈfɔːtræn ˌsevənti ˈsevn/ [4] formula translation, a programming language widely used for scientific computation. The '77' defines the year in which the official standard (to which the language conforms) was issued

frame-grabber /ˈfreɪm ˌgræbə(r)/ [14] a device for capturing a still video image and converting it into a digital form that can be viewed on a computer screen. By capturing a sequence of still images it can effectively create a moving picture

free-format /friː ˈfɔːmæt/ [10] describing data whose structure is not pre-defined

full-motion video /fʊl ˌməʊʃn ˈvɪdɪəʊ/ [14] captured and digitized video images displayed on a computer screen giving the viewer the impression of watching a television picture

functional language /ˈfʌŋkʃənl ˈlæŋgwɪdʒ/ [4] a programming language whose programs consist typically of sets of unordered equations that characterize functions and values. The values that are characterized by the equations include the desired results, and these values are calculated by executing the program

function register /ˈfʌŋkʃn ˌredʒɪstə(r)/ [1] a register used to control the processing of a function



gateway /ˈgeɪtweɪ/ [3] a device that links two networks in a way that is usually visible to the network users (as opposed to a bridge which is not visible). Gateways may deal with differences of protocol and naming convention when converting between the two networks.

grammar check /ˈgræmə tʃek/ [5] software that attempts to correct the grammar of a piece of text, or offer advice on its structure

graphical (user) interface /ˌgræfɪkəl (ˌjuːzə) ˈɪntəfeɪs/ [1] a style of interaction between the user and the computer involving a graphics screen, icons, and some form of pointing device such as a mouse. *See* command line interface *and* window.

graphics /ˈgræfɪks/ [3,15] a non-character based method of displaying information on a screen, usually used for displaying pictures. The basic unit from which the display is built up is the pixel.

grid /grɪd/ [2] used for touch screen and pen-based computers. Voltage is sent across the glass in horizontal and vertical lines forming a grid

GUI /ˌdʒiː juː ˈaɪ/ [1] graphical user interface



hacker /ˈhækə(r)/ [7] a person who attempts to breach the security of a computer system by access from a remote point. This may be for amusement or for a more sinister purpose.

hard disk /ˌhɑːd ˈdɪsk/ [2] a fixed disk inside a computer which may not be removed

hardware ˈhɑːdweə(r) [1] the computer equipment and its peripherals

hardware interrupt ˌhɑːdweər ˈɪntərʌpt [2] *see* interrupt

HDD ˌeɪtʃ diː ˈdiː [2] hard disk drive

hexadecimal ˌheksəˈdesɪməl [B] arithmetic to the base 16

high-level language ˌhaɪ ˌlevl ˈlæŋgwɪdʒ [4] a language in which each instruction represents several machine code instructions, making the notation more easily readable by the programmer

home-shopping service ˌhəʊm ˈʃɒpɪŋ ˌsɜːvɪs [3] an online service that allows one to purchase items by placing an order over the network, usually by credit card



IAL ˌaɪ eɪ ˈel [4] international algebraic language, former name for ALGOL

IBM ˌaɪ biː ˈem [1] International Business Machines

IBM-compatibility ˌaɪ biː ˌem kəmˌpætəˈbɪləti [1] describing computers that conform to the hardware specification of the IBM PC and will run all the hardware that an IBM PC will run

icon ˈaɪkɒn [1] a visual symbol or picture used in a menu to represent a program or a file. The program is usually initiated by using a mouse and clicking the mouse's button when the cursor is over the icon

image compression /ˈɪmɪdʒ kəmˌpreʃn [10] a technique for reducing the amount of space that a graphics image will take to store in computer storage

index ˈɪndeks *n* [8] a set of links that can be used to locate records in a data file

index generation ˈɪndeks dʒenəˌreɪʃn [5] the facility to automatically generate a sorted alphabetical index for a document

infected ɪnˈfektɪd [7] of a computer, being inhabited by a computer virus

infector ɪnˈfektə(r) [7] something that transmits a computer virus

inference engine ˈɪnfərəns ˌendʒɪn [13] within the context of expert systems the part of the expert system that operates on the knowledge base and produces inferences

information technology ɪnfəˌmeɪʃn tekˈnɒlədʒɪ [9] any form of technology, incorporating computing, telecommunications, electronics, and broadcasting, used by people to handle information

inference tree ˈɪnfərəns triː [13] the structure of a set of inferences which show how a conclusion was reached

information separators ɪnfəˈmeɪʃn ˌsepəreɪtəz [3] control characters used to delimit the boundaries of pieces of information

Information Services Manager ˌɪnfəˌmeɪʃn ˌsɜːvɪsɪz ˈmænɪdʒə(r) [8] the head of the computer department

information system ɪnfəˈmeɪʃn ˌsɪstəm [8] a computer based system with the defining characteristic that it provides information to users in one or more organizations

ink jet printer ˈɪŋk dʒet ˌprɪntə(r) [1] a printer that produces an image by squirting a fine jet of ink onto specially absorbent paper

input ˈɪnpʊt *n* [1] the information which is presented to the computer

input /ˈɪnpʊt *v* put information to a computer for storage or processing

input device /ˈɪnpʊt dɪˌvaɪs [1] any device that allows data to be passed into the computer

input-output ˌɪnpʊt ˈaʊtpʊt [12] the part of a computer system or the activity that is primarily dedicated to the passing of data into or out of the central processing unit

input port /ˈɪnpʊt ˌpɔːt [1] the socket into which an input device may be plugged on a computer

input tagging ˈɪnpʊt ˌtægɪŋ [5] a feature of word-processing software that allows text to be pre-coded with tags so that the correct format can be applied automatically

instruction ɪnˈstrʌkʃn [2] part of a computer program which tells the computer what to do at that stage

integrated circuit ˌɪntɪgreɪtɪd ˈsɜːkɪt an implementation of a particular electronic-circuit function in which all the individual devices required to realize the function are fabricated on a single chip of semiconductor

interactive ɪntəˈræktɪv [D] describing a system or a mode of working in which there is a direct response to the user's instructions as they are input

interactive video ˌɪntəræktɪv ˈvɪdɪəʊ [9] a computerized video system used for learning or play, in which the user interacts with the video

interface ˈɪntəfeɪs [B] a common boundary between two systems, devices or programs

interface cable ˈɪntəfeɪs ˌkeɪbl [B] the logic cable between the computer and a device. Signals and data are passed over this link.

interlaced video ɪntəleɪst ˈvɪdɪəʊ [14] in narrow-band PAL systems, a method of transmitting all 625 lines of a single TV image in a fiftieth of a second, whereby each frame of the image is split into two fields of 312.5 lines

internal memory /ɪnˌtɜːnl ˈmemərɪ/ [1] memory held within the CPU. The main storage or primary memory of the computer

internal modem /ɪnˌtɜːnl ˈməʊdem/ [8] a modem which can be fitted inside a computer rather than a separate piece of equipment

internal schema /ɪnˌtɜːnl ˈskiːmə/ [10] the way that the data is physically held in a database

internal storage /ɪnˌtɜːnl ˈstɔːrɪdʒ/ *see* internal memory

Internet /ˈɪntənet/ [8] an informal shared public network linking UNIX and other computers world-wide using the Internet protocol (IP)

interrupt /ˈɪntərʌpt/ *n* [2] a signal to the processor that a higher priority event has occurred and must be serviced, causing the current sequence of events to be temporarily suspended

I/O /ˌaɪ ˈəʊ/ input output

I/O device /ˌaɪ ˈəʊ dɪˌvaɪs/ any device that allows input or output to a computer

IP /ˌaɪ ˈpiː/ [8] Internet protocol

ISDN /ˌaɪ es diː ˈen/ [3] Integrated Services Digital Network, a concept developed by PTTs providing one network to transmit all forms of signal traffic, e.g. voice and data over the same lines

ISO /ˌaɪ es ˈəʊ/ International Standards Organisation

IT /ˌaɪ ˈtiː/ [9] information technology



joy stick /ˈdʒɔɪstɪk/ [1] an input device used in computer games for controlling the cursor or some other symbol in its movement around a screen

junction box /ˈdʒʌŋkʃn bɒks/ [6] a box attached to a network which attaches a device to the network

K

K /keɪ/ [1] kilobyte: unit of measure of memory or disk space in thousands of bytes. 1 kilobyte is 1024 bytes.

keyboard /ˈkiːbɔːd/ [1] an input device like a typewriter for entering characters. The depression of a key causes a signal to be transmitted to the computer.

keyboard lock /ˈkiːbɔːd lɒk/ [7] a security method whereby the screen is cleared and the keyboard is locked after a pre-set period of inactivity to prevent unauthorized use

key number /ˈkiː nʌmbə(r)/ [8] a unique number generated to identify a record

knowledge base /ˈnɒlɪdʒ beɪs/ within the context of expert systems, a collection of knowledge that has been formalized into the appropriate representation with which to perform reasoning, usually a set of rules about the subject



LAN /læn/ [5] local area network

laptop /ˈlæptɒp/ [2] *see* portable computer

laser printer /ˈleɪzə prɪntə(r)/ [1] a non impact printer in which the paper is charged electrostatically with an image of the whole page to be printed. This attracts dry ink powder which is then baked on to the paper

LaserWriter /ˈleɪzəˌraɪtə(r)/ [5] a laser printer manufactured by Apple Corporation

LCD /ˌel siː ˈdiː/ [2] liquid crystal display

linkage editor /ˈlɪŋkɪdʒ ˌedɪtə(r)/ [4] a systems program which fetches required systems routines and links them to the application program object module

liquid crystal display /ˌlɪkwɪd krɪstl dɪsˈpleɪ/ [2] one type of technology that is used to produce flat monochrome computer screens. Such screens do not have their own internal illumination

LISP /lɪsp/ [4] list processing: a programming language designed for the manipulation of non-numeric data. It is commonly used in artificial intelligence research.

load module /ˈləʊd ˌmɒdjuːl/ [4] the program which is directly executable by the computer

local area network /ˌləʊkəl eərɪə ˈnetwɜːk/ [5,6] a network linking a number of nodes in the same area, limited usually to a building or sites up to a kilometre apart

logical operation /lɒdʒɪkəl ɒpəˈreɪʃn/ [1] an operation on logical values producing a Boolean result of true or false

logical record /lɒdʒɪkəl ˈrekɔːd/ [10] the collection of data in a database relating to one subject

logical unit /lɒdʒɪkəl ˈjuːnɪt/ [1] *see* arithmetic logic unit

LOGO /ˈləʊgəʊ/ [4] a programming language developed for use in teaching young children

log on /lɒg ˈɒn/ [2] identify oneself to a computer system in order to gain access to it

loop /luːp/ *n* [4] a sequence of instructions that is repeated until a certain condition is reached

low-level language /ˌləʊ levl ˈlæŋgwɪdʒ/ a language such as assembly language in which each instruction has one corresponding instruction in machine code

M

Mac /mæk/ [5] Apple Macintosh computer

machine code /məˈʃiːn ˌkəʊd/ [4] the code actually executed by the computer, not easily readable by the programmer

machine translation /məˈʃiːn trænzˈleɪʃn/ [13] the use of computers to translate natural languages

magnetic card reader /mægˈnetɪk ˈkɑːd riːdə(r)/ [1] a device for reading the data held on the magnetic strip on a card such as a credit card

magnetic tape /mægˈnetɪk ˈteɪp/ [4] a strip of plastic coated with magnetic oxide used to store information sequentially. Tapes may be hundreds of feet long

mail analyst /ˈmeɪl ˈænəlɪst/ [8] someone who is responsible for directing mail which has been scanned using a DIP system, to the correct recipient

mail merge /ˈmeɪl ˈmɜːdʒ/ [5] a software feature which allows the user to read in a file of names and addresses and create 'personalized' letters for mail shots

mainframe (computer) /ˈmeɪnfreɪm (kəmˌpjuːtə(r))/ [1] a large computer which requires a special environment for temperature and humidity in order to run it. This is in contrast to minicomputer or microcomputer

main storage /ˌmeɪn ˈstɔːrɪdʒ/ [1] *see* internal memory

management information system /ˌmænɪdʒmənt ɪnfəˈmeɪʃn ˌsɪstəm/ [8] a (computerized) system for providing information to management

maths function /ˈmæθs ˌfʌŋkʃn/ [5] a software feature which allows simple mathematical functions to be carried out (such as totalling columns)

Mb /ˈmegəbaɪt/ [1] megabyte

megabyte /ˈmegəbaɪt/ [1] one million bytes, unit of measure for the amount of memory or disk storage on a computer

megaflop /ˈmegəflɒp/ [12] a million floating point instructions per second. Floating point notation is a representation of real numbers that allows both very large and small numbers to be conveniently represented. A floating point instruction is an arithmetic operation on two floating point numbers.

memory /ˈmeməri/ [1] a device or medium that can retain information for later retrieval. It is usually used to refer to the internal storage of a computer that can be directly addressed by operating instructions.

memory board /ˈmeməri bɔːd/ a circuit board which contains additional memory for a computer

menu-driven /ˈmenjuː drɪvən/ [14] describing a program that obtains input by displaying a list of options (the menu) from which the user indicates his choice

message-base posting /ˈmesɪdʒ ˌbeɪs ˌpəʊstɪŋ/ [3] another form of e-mail

MHz /ˈmegəhɜːts/ [1] MegaHertz, a measure of the speed of a computer's CPU. In millions it measures the number of processing cycles performed by the CPU

micro /ˈmaɪkrəʊ/ [4] *see* microcomputer

microchip /ˈmaɪkrəʊtʃɪp/ [1] a semiconductor device used to build the hardware of a computer

microcomputer /ˌmaɪkrəʊkəmˈpjuːtə(r)/ [2] a computer whose CPU is a microprocessor semiconductor chip

microprocessor /ˌmaɪkrəʊˈprəʊsesə(r)/ [1] a semiconductor chip that forms the central processor of a computer

Microsoft /ˈmaɪkrəʊsɒft/ [4] a computer software company

minicomputer /ˈmɪnikəmˌpjuːtə(r)/ [B] originally a computer contained within a single equipment cabinet. Compared with mainframes they are usually smaller and slower. The word is no longer used very specifically since the advent of microcomputers

Minitel /ˈmɪnitel/ [3] a French online system originally provided by the PTT to provide access to French telephone directories. The service has been expanded since its original introduction

modem /ˈməʊdem/ [3] modulator and demodulator: a device that converts the digital bit stream used by the computer into an analog signal suitable for transmission over a telephone line (modulation), and then converts it back to digital (demodulation)

monitor /ˈmɒnɪtə(r)/ [8] *see* VDU

monochrome /ˈmɒnəʊkrəʊm/ [B] describing a screen with a single colour display

mouse /maʊs/ [1] a device used to point at a location on a computer screen. It is moved around by hand on a flat surface. The movements on the surface correspond to movements on the screen. The mouse has one or more buttons to initiate an action on the screen

MPC /ˌem piː ˈsiː/ [14] multimedia personal computer, Microsoft's minimum specifications for hardware to be used for multimedia purposes

MS/DOS /ˌem es ˈdɒs/ [1] Microsoft disk operating system

MT /ˌem ˈtiː/ [13] machine translation

multimedia /ˌmʌltiˈmiːdiə/ [5,14] an application of computer technology that allows the capture, manipulation, and presentation of different types of data, e.g. text, graphics, video, animation, sound, etc

multiple rulers ˌmʌltɪpl ˈruːləz [5] rulers to define margins and tab settings
multiplexor ˈmʌltɪpleksə(r) [3] a device that merges information from several communications channels into one channel. It is a two way device and is also used to separate out the combined signal into the individual channels.
multiprogramming ˌmʌltɪˈprəʊɡræmɪŋ [2] *see* multi-tasking
multi-sync monitor ˌmʌltɪ ˈsɪŋk ˈmɒnɪtə(r) [14] a video monitor that can synchronize a range of video devices to a common time-base
multi-tasking ˌmʌltɪ ˈtɑːskɪŋ [2] used of computers capable of running more than one program at the same time, although on most only one program has control and is executing at any given moment
multi-user ˈmʌltɪˌjuːzə(r) [1,10] describing computer systems which allow access by more than one user simultaneously

N

NCR en siː ɑː [2] National Cash Register, now a computer company
network ˈnetwɜːk [1,6] a system which connects up a number of computers and communications devices to enable messages and data to be passed between those devices
network-compatible ˌnetwɜːk kəmˈpætɪbl [5] describing software that can be run on a network with shared files rather than as a stand alone piece of PC software
network traffic ˈnetwɜːk ˌtræfɪk [6] the data transmitted around a network
node nəʊd either a point in a network where communications lines are interconnected, or where a workstation or a mainframe computer is attached
notation nəʊˈteɪʃn a system of symbols
notebook ˈnəʊtbʊk [2] *see* portable computer
numeric njuːˈmerɪk *adj* [1] describing data which only contains numbers

O

object module ˈɒbdʒekt ˈmɒdjuːl [4] *see* object program
object-oriented ˈɒbdʒekt ˈɔːrɪentɪd [4] describing a computer architecture in which all processes, files, I/O operations, etc., are represented as objects (i.e. data structures in memory that may be manipulated by hardware and software). The IBM System 38 is an example of an object-oriented architecture system.
object program ˈɒbdʒekt ˌprəʊɡræm [4] the result of converting source code into machine code using a compiler
OCR əʊ siː ˈɑː [8] optical character recognition: a process in which a machine scans, recognizes, and encodes information printed or typed in alphanumeric characters
octal ˈɒktəl [B] arithmetic to the base 8
off-line ˌɒfˈlaɪn describing any part of a computer system which operates independently of the central processing unit
online, on-line ɒnˈlaɪn [3] used of computer services that are accessed from a terminal interactively
online service ˌɒnlaɪn ˈsɜːvɪs [3] a public database or bulletin board which can be accessed over a computer or telephone network
operating environment ˈɒpəreɪtɪŋ ɪnˈvaɪərənmənt [5] the hardware and operating system being used
operating system ˈɒpəreɪtɪŋ ˌsɪstəm [1,2] the set of programs that jointly control the system resources and the processes using those resources on a computer
operator ˈɒpəreɪtə(r) **1** [C] someone responsible for running a computer (usually a mainframe) **2** [4] *see* relational operator
optical character reader ˈɒptɪkəl ˈkærəktə(r) ˈriːdə(r) [K] a device which scans, recognizes, and encodes information printed or typed in alphanumeric characters
OS əʊ ˈes [2] operating system
OS/2 ˌəʊ es ˈtuː [4] an operating system for IBM PCs
outliner ˈaʊtlaɪnə(r) [5] a writing aid to enable the structure of a document to be worked out in advance and used as a guide when writing the detailed document
output ˈaʊtpʊt *n* [1] the result of performing arithmetic and logical operations on data. It can be displayed on screen or transmitted by the computer
output ˌaʊtˈpʊt *v* transmit processed data to a physical medium such as a printer or disk drive
output device ˈaʊtpʊt dɪˌvaɪs [1] a device which transmits or displays processed data, e.g. a printer, disk drive, or VDU screen
output port ˈaʊtpʊt ˌpɔːt [1] the socket into which an output device may be plugged



package ˈpækɪdʒ [4] *see* software package
paint software ˈpeɪnt ˌsɒftweə(r) [5] software that allows the user to create graphics images using techniques that emulate painting and drawing

PAL pæl [14] the European standard for television and video systems requiring a vertical refresh rate of 50kHz

palmtop 'pa:mtɒp [8] *see* portable computer

parallel 'pærəlel 1 [1] describing the transfer of data across the interface by having one connection per bit of a data word, e.g. for 8 bits there would be 8 connections in parallel. The control signals are also carried on individual connections in parallel. *See* serial *and* bit 2 [12] describing computers with more than one central processing unit which work in parallel to solve a problem simultaneously

parameter pə'ræmɪtə(r) [4] information which is passed to a program subroutine

parse pa:z, v [6] analyse the syntax of an input string

PASCAL pæs'kæl [4] a programming language designed as a tool to assist the teaching of programming as a systematic discipline

password 'pa:swɜ:d [7] a method of security in which the user has to enter a unique character string before gaining access to a computer system

PC pi: si: personal computer

PDP II pi: di: pi: tu: a DEC minicomputer

pen-based computer ,pen beɪst kəm'pju:tə(r) [2,8] a computer which uses a pointing device like a pen as an input device

performance pə'fɔ:məns [10] the speed of a computer or computer system

peripheral pə'rɪfərəl [1] an input or output device attached to a computer

peripheral bus pə'rɪfərəl ,bʌs [1] the communications link to which peripherals are attached

physical record fɪzɪkəl 'rekɔ:d [10] the collection of data transferred as a unit

pirate 'paɪərət, v [7] use software that has been copied in breach of copyright

pixel 'pɪksəl [2] an individual dot on a computer screen. The computer controls the colour and brightness of each pixel.

PL/I pi: el 'wʌn [4] programming language I. A programming language developed by the US IBM users' group implementing the best features of COBOL, FORTRAN and ALGOL

platform /'plætfɔ:m [14] a generic term for different types of computer system (e.g. PC, Mac, workstation, etc.)

plotter 'plɒtə(r) [K] an output device for translating information from a computer into pictorial or graphical form on paper or a similar medium

plug-(and-play) compatibility ,plʌg ənd 'pleɪ kəmpætə,bɪləti [14] the ability to connect one manufacturer's hardware directly to another manufacturer's hardware

port pɔ:t [1] a connection point that allows I/O devices to be connected to the internal bus of a microprocessor

portable 'pɔ:təbl [4] describing programs which can run on a variety of hardware or under a variety of operating systems

portable (computer) ,pɔ:təbl kəm'pju:tə(r) 1 [2] the generic term for any microcomputer that is designed to be carried around 2 [2] the largest type of computer designed to be carried around. It must be connected to the mains electricity supply. Other smaller types include laptops, notebooks, clipboards, and palmtops (or personal organizers). These have an internal power source

primary memory 'praɪməri 'meməri [1] *see* internal memory

printer 'prɪntə(r) [1] an output device which changes output data into printed form

printout 'prɪntaʊt/ the printed pages which are output from a computer

print-to-tape device ,prɪnt tə 'teɪp dɪ,vaɪs [14] a device which allows computer-generated images to be recorded to video for playback on a TV monitor

processing /'prəʊsesɪŋ [1] the performing of arithmetic or logical operations on information which has been input to a computer

processor 'prəʊsesə(r) [1] *see* CPU

program 'prəʊgræm [1] a list of instructions which are used by the computer to perform the user's requirements

programmer /'prəʊgræmə(r) [4] someone who writers computer programs

programming /'prəʊgræmɪŋ [4] the act of writing a computer program

programming language 'prəʊgræmɪŋ læŋgwɪdʒ [4] a notation for the precise description of computer programs

proprietary prə'praɪətri [8] describing a protocol or standard developed and owned by a particular manufacturer

protocol /'prəʊtəkɒl [3] an agreement that covers the procedures used to exchange information between co-operating entities

PTT ,pi: ti: ti: [3] Postal, Telegraph, and Telephone Administration, the national government communications organization of many countries

public database ,pʌblɪk 'deɪtəbeɪs [1] a database which is accessible over a public network



query 'kwɪəri [6] a request for information from a database



radiation screen /reɪdɪ'eɪʃn ˌskriːn/ [8] a screen placed in front of a VDU to protect a user from possibly harmful radiation from the screen

RAM /ræm/ [1] random-access memory: this is memory which can be read and written to. The basic element is a single cell capable of storing one bit of information. Each cell has a unique address in memory and so can be accessed in random order.

raw data /ˌrɔː 'deɪtə/ [2] data which has not been interpreted

real-time program /'rɪəl taɪm ˌprəʊgræm/ [2] a program that interacts with the users in such a way that the timing of the interaction is significant. This is usually because the input corresponds to some movement in the physical world and the output has to relate to the same movement.

record /'rekɔːd/ [10] a collection of data handled together in movements to and from storage. Files held in storage are frequently treated as sequences of records.

refresh rate /rɪ'freʃ ˌreɪt/ [14] *see* vertical refresh rate

register /'redʒɪstə(r)/ [1] a group of devices that are used to store information within a computer for high-speed access. Some registers may be used as counters.

relational operator /rɪˌleɪʃənl 'ɒpəreɪtə(r)/ [4] a symbol representing an operation that compares two values and returns a truth value. Operators include 'greater than...', 'equal to...', and 'less than...'.

remote device /rɪ'məʊt dɪˌvaɪs/ [6] a device connected over a WAN

repetitive-strain injury /rɪˌpetɪtɪv 'streɪn ˌɪndʒərɪ/ [8] a medical condition apparently caused by using a keyboard in an inappropriate position. The symptoms are that the muscles in the lower arm and fingers may seize up.

response /rɪ'spɒns/ [6] the elapsed time between an action by a computer system and the receipt of some form of response from the system

ring network /'rɪŋ ˌnetwɜːk/ [6] a network constructed as a loop of unidirectional links between nodes

robot /'rəʊbɒt/ [10] a programmable device consisting of mechanical manipulators and sensory organs. The main goal of robotics research is to provide the robot with an artificial eye and to use visual perception to guide a mechanical arm in a flexible manner.

robotics /rəʊ'bɒtɪks/ [11] a discipline (lying across the border between artificial intelligence and mechanical engineering) which is concerned with building robots

ROM /rɒm/ [1] read-only memory: this is memory used for storage of data that cannot ever be modified. The memory contents are permanently built into the device when it is manufactured.

RS/6000 /ˌɑːr es sɪks 'θaʊzənd/ [14] a model of IBM computer which is UNIX based

RSI /ˌɑːr es 'aɪ/ repetitive-strain injury



satellite /'sætəlaɪt/ [9] in communications technology, a man-made device in orbit round the Earth used to relay back telephone messages or radio and TV signals from another part of the Earth

scan /skæn/ *n* [8] a scanned image

scan /skæn/ *v* [8] process a document through a scanner

scan converter /'skæn kənˌvɜːtə(r)/ [14] a device for converting the vertical refresh rate of video signals (50 kHz) to the vertical refresh rate of 60kHz or more used by computer systems

scanner /'skænə(r)/ *n* [8] an input device which reads images on paper using a photoelectric cell and produces a computer graphic file as output. The image scanned may be a bar code, a picture, or a piece of text.

scan rate /'skæn reɪt/ [14] *see* vertical refresh rate

scramble /'skræmbl/ *v* jumble up a string so that it can only be read after decoding

screen /skriːn/ [10] the part of a visual display unit on which the program, data, and graphics may be seen

secondary memory /ˌsekəndrɪ 'memərɪ/ [L] storage space which is outside the main memory of the computer. It can be in the form of either sequential tapes or random-access disks.

security reporting /sɪ'kjʊərətɪ rɪˌpɔːtɪŋ/ [7] feature of a security system which reports, to an administrator, attempted breaches to the security of a system

security system /sɪ'kjʊərətɪ ˌsɪstəm/ [7] a system which controls access to a computer and maintains the security of that computer

semiconductor /semɪkən'dʌktə(r)/ [J] a material whose electrical conductivity increases with temperature and is intermediate between metals and insulators

sensor /'sensə(r)/ *n* [12] an electronic device to detect movement

sequence control register /ˌsiːkwəns kən'trəʊl ˌredʒɪstə(r)/ [1] a register which controls the sequence in which operations are performed by the computer

sequential device /sɪˌkwenʃl dɪˈvaɪs/ a device such as a magnetic tape drive which permits information to be written to or read from in a fixed sequence only

serial /ˈsɪərɪəl/ describing the transfer of data one bit at a time. Control signals are also passed in sequence with the data.

service technician /ˈsɜːvɪs tekˌnɪʃn/ [8] an engineer who repairs computers

session /ˈseʃn/ [6] a period during which two computers are linked

shared-line /ˌʃeəd ˈlaɪn/ [3] describing the use of a telephone line to transmit more than one set of data at a time

shield /ʃiːld/ *n* [7] *see* virus shield

shield /ʃiːld/ *v* [10] protect

signal lines /ˈsɪgnəl ˌlaɪnz/ [1] cables over which a computer control signal and data may be passed

signature /ˈsɪgnətʃə(r)/ [7] *see* virus signature

sign off /ˌsaɪn ˈɒf/ log off a computer system

sign up /ˌsaɪn ˈʌp/ [8] log on to a computer system

silicon /ˈsɪlɪkən/ [J] a non-metallic element with semiconductor characteristics

Silicon Valley /ˌsɪlɪkən ˈvælɪ/ [E] area of California where there are many computer technology companies

slot /slɒt/ [14] *see* expansion slot

Smalltalk /ˈsmɔːltɔːk/ [4] an object-oriented language, an object-oriented environment, and a library of objects first developed at the Xerox Palo Alto Research Centre

smart card /ˈsmɑːtkɑːd/ [3] a card containing a microchip which can be used to store large amounts of information

software /ˈsɒftweə(r)/ [4] a general term for any computer program(s)

software base /ˈsɒftweə ˌbeɪs/ [2] the collection of applications written for a particular hardware and software environment

software developer /ˈsɒftweə dɪˌveləpə(r)/ [5] someone who writes software

software house /ˈsɒftweə ˌhaʊs/ [2] a company that specializes in writing application software

software package /ˈsɒftweə ˌpækɪdʒ/ [5] a series of programs written for a generic application, e.g. a payroll package, which can be adapted by the user to meet individual needs

source file /ˈsɔːs faɪəl/ [4] *see* source program

source program /ˈsɔːs ˌprəʊgræm/ [4] the original high-level language program which has to be converted to machine code before it may be executed

spell check dictionary /ˈspel tʃek ˌdɪkʃənrɪ/ [5] a list of correctly spelt words used by word-processing software to validate the spelling in a document

spooling /ˈspuːlɪŋ/ [C] the process of storing output temporarily on disk or tape until it is ready to be printed

spreadsheet /ˈspredʃiːt/ [2] a program that manipulates tables consisting of rows and columns of cells and displays them on a screen. The value in a numerical cell is either typed in or is calculated from values in other cells. Each time the value of a cell is changed the values of dependent cells are recalculated.

SQL /ˌes kjuː ˈel/ [6] structured query language

standard /ˈstændəd/ [5] a publicly available definition of a hardware or software component resulting from national, international, or industry agreement

star network /ˈstɑː ˌnetwɜːk/ [6] a simple network topology with all links connected directly to a single central node

statement terminator /ˈsteɪtmənt ˌtɜːmɪneɪtə(r)/ [4] a special character which indicates the end of a statement in a programming language

string /strɪŋ/ [2] a sequence of bytes

structured programming /ˌstrʌktʃəd ˈprəʊgræmɪŋ/ [4] a method of programming development that makes extensive use of abstraction in order to factorize the problem and give increased confidence that the resulting program is correct

structured query language /ˌstrʌktʃəd ˈkwɪərɪ ˌlæŋgwɪdʒ/ [6] a high-level language for writing routines to query relational databases. Originally developed by IBM in 1973, it is now an ANSI standard.

style sheet /ˈstaɪəl ʃiːt/ [5] a word-processing software feature that ensures a uniform style within a document

stylus /ˈstaɪələs/ [1] an electronic I/O device that is used to draw or write on the screen

subprogram /ˈsʌbˌprəʊgræm/ [4] a small program called by another program to perform a specific function

support group /səˈpɔːt ˌgruːp/ [8] a group of staff who are specialists in a particular piece of software

switched network /ˌswɪtʃt ˈnetwɜːk/ [6] a network topology in which a central switching device is used to connect devices directly

synchronous /ˈsɪŋkrənəs/ **1** [6] taking place at precisely the same time **2** involving a type of computer control whereby sequential events take place at fixed times

synchronous orbit satellite /ˌsɪŋkrənəs 'ɔːbɪt ˌsætəlaɪt/ [6] a satellite that orbits the Earth at a controlled speed so that it maintains its position in relation to the Earth

system board /'sɪstəm bɔːd/ [2] the main circuit board of a computer containing the microprocessor chip. Other devices will be attached to this board.

systems analysis /'sɪstəmz əˌnæləsɪs/ [K] the activity performed by an analyst

systems analyst /'sɪstəmz ˌænəlɪst/ *see* analyst

systems manager /'sɪstəmz ˌmænɪdʒə(r)/ [7] a person responsible for the management and administration of a computer system

systems program /'sɪstəmz ˌprəʊgræm/ [4] a program written for a particular type of hardware. Examples are operating systems and compilers. They are usually provided by the manufacturer.

systems routine /'sɪstəmz ruːˌtiːn/ [4] utility programs provided by the computer operating system. These might be used for converting numerical data into different formats, or performing operations on dates.

systems software /'sɪstəmz ˌsɒftweə(r)/ [J] *see* systems program



table /'teɪbl/ [10] used to refer to data held in a database in a conceptual schema which is a flat two-dimensional table

table of contents /ˌteɪbl əv 'kɒntents/ [5] a word-processing software feature which can automatically generate a table of contents for a document

tag /tæg/ [5] a code used in word processing or DTP to denote a feature of a document, such as bold type, the start of a paragraph, or an index word

tape drive /'teɪp draɪv/ [L] a device on which a magnetic tape is mounted in order that information may be transmitted from the tape to the memory of the computer or vice versa

template /'templeɪt/ [2] a pre-shaped pattern used as a guide

terminal /'tɜːmɪnəl/ [2] a VDU screen and keyboard used to interact with a computer, usually with no computing capacity of its own

test suite /'test swiːt/ [13] a set of sentences or phrases in a given language designed to test the effectiveness of a machine translation system

token /'təʊkn/ [6] a unique sequence of bits granting permission to a user to send on a network

trackball /'trækbɔːl/ [I] an upside down mouse. It consists of a ball supported on bearings so that it is free to rotate in any direction. The ball is rotated by the operator to control the cursor and, as with a mouse, there are buttons to click to initiate an action.

transaction /træn'zækʃn/ [10] a logical unit of work for a database

transaction processing system /trænzˌækʃn 'prəʊsesɪŋ ˌsɪstəm/ [8] a system which processes the operational transactions of an organization

transistor /træn'zɪstə(r)/ [F] a semiconductor device having three terminals that are attached to electrode regions within the device

transmission /trænz'mɪʃn/ [6] the sending of a message

transmitter /trænz'mɪtə(r)/ [10] a device for sending a radio message

trigger /'trɪgə(r)/ *v* [7] set a process in motion

turnkey /'tɜːnkiː/ [J] describing a system in which hardware and software have been delivered by the supplier so that the whole system can be put to immediate use

type declaration statement /taɪp dekləˈreɪʃn ˌsteɪtmənt/ [4] *see* declaration statement

U

UNIX /'juːnɪks/ [4] an operating system originally developed by Bell laboratories in 1971 for DEC PDP 11 minicomputers. UNIX has become very popular and is now implemented on a wide range of hardware.

update /ʌp'deɪt/ *v* [2] modify data held by a computer system

upgrade /'ʌpgreɪd/ *n* [5] a later version of software

upgrade /ʌp'greɪd/ *v* [1] replace or modernize software with a later version of the same software

user /'juːzə(r)/ [6] an individual or group making use of the output of a computer system

user-friendly /juːzə 'frendlɪ/ [E] describing interactive systems that are designed to make the user's task as easy as possible by providing feedback

user interface /juːzər 'ɪntəfeɪs/ [6] the means of communicating between a human being and a computer

utility program /juː'tɪlətɪ ˌprəʊgræm/ the collection of programs that form part of every computer system and provide a variety of generally useful functions



variable /'veərɪəbl/ *n* [4] a string of characters used to denote a value stored within a computer which may be changed during execution

VDU /ˌviː diː ˈjuː/ [1] visual display unit: the screen of a computer terminal or PC

vertical refresh rate /ˌvɜːtɪkl rɪˈfreʃ reɪt/ [14] the number of times per second that an image is written on a TV or computer screen, measured in kiloHerz

VGA /ˌviː dʒiː ˈeɪ/ [14] video graphics array: a standard for colour monitors developed by IBM for their PS/2 range of PCs

virtual reality /ˌvɜːtjʊəl rɪˈæləti/ [10,12] an attempt to create an artificial world within a computer in which the user can (apparently) move about. This is usually achieved by the user wearing a helmet which covers the eyes and ears and sends visual and oral signals to the user. Special gloves allow the user to manipulate computer-generated items.

virtual storage /ˌvɜːtjʊəl ˈstɔːrɪdʒ/ when disks are connected to a computer and used as an extension of internal memory in order to increase the capacity of primary storage

virus /ˈvaɪərəs/ [7] a self-replicating program, usually designed to damage the system on which it lands

virus checking program /ˈvaɪərəs ˌtʃekɪŋ ˌprəʊgræm/ [7] a program that is used to detect the presence of a virus in memory or on disk

virus scanner /ˈvaɪərəs ˌskænə(r)/ [7] a program that detects viruses which have already infected a computer

virus shield /ˈvaɪərəs ʃiːld/ [7] a program that detects viruses as they attempt to infect the computer

virus signature /ˈvaɪərəs ˌsɪgnətʃə(r)/ [7] the particular features of each computer virus that enable it to be recognized

voice recognition /ˈvɔɪs rekəgˌnɪʃn/ [8] the technology that allows a computer to interpret human speech. This is a part of artificial intelligence studies.

voltmeter /ˈvɒltmiːtə(r)/ [2] a meter for measuring voltage

VR /ˌviː ˈɑː/ [12] virtual reality



WAN /wæn/ [6] wide area network

war game /ˈwɔː geɪm/ [12] a computer game which emulates warfare

wide area network /ˌwaɪd ˌeərɪə ˈnetwɜːk/ [6] a network linking nodes over long distances

window /ˈwɪndəʊ/ [1] a type of graphical user interface. Separate tasks are represented by a rectangular portion of the screen called a window. A window may display a menu, and an option on the menu is selected by use of a mouse.

word processing /ˈwɜːd prəʊsesɪŋ/ [5] the use of a computer to compose documents with facilities to edit, re-format, store, and print documents with maximum flexibility

work scheduling /ˈwɜːk ˌʃedjʊəlɪŋ/ [2] the process of allocating computer resources between different programs running on a multi-tasking computer

workstation /ˈwɜːksteɪʃn/ [14] a powerful single-user computer, usually attached to a network

worm /wɜːm/ [7] an entirely self-replicating virus which is not hardware dependent

write-protect tab /ˌraɪt prəˈtekt tæb/ [7] a notch on a floppy disk which may be covered to prevent the disk being written to